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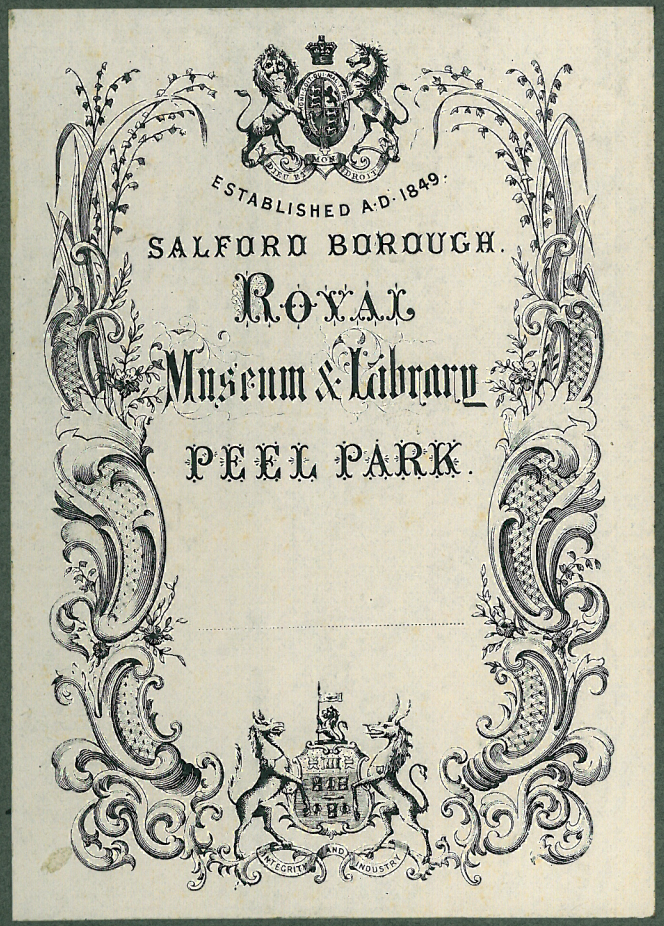
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THE LANCASHIRE NATURALIST

A Journal of Natural History for the County of Lancashire, and for the adjacent districts of Cheshire, Derbyshire, Westmorland, the Lake District, North Wales, and the Isle of Man.

CONDUCTED BY W. H. WESTERN.

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SOCIAL GROUPS AND ADAPTIVE CHARACTERS IN THE BRYOPHYTA.

By J. A. Wheldon, F.L.S.

(Continued from page 408, vol. 3.).

Part II.—Adaptive Characters in the Gametophyte.

A. The Protonema.—The first stage in the growth of a moss plant from a spore is the protonema, which usually consists of interlacing alga-like filaments, from which the gametophore originates by a process of budding. In the Hepaticæ it is less sharply differentiated from, and seems to imperceptibly develop into the gametophore. In many species of this group also, as in the Sphagna and some mosses (*e.g.*, *Andræa* and *Tetraphis*) the protonema assumes a thalloid type. But as a rule, in its primary form it presents little variability, and is generally evanescent, disappearing soon after the young plant is established. In the strongly saphrophytic genus Buxbaumia (Fig. 2), where the gametophore is rudimentary, the vegetative tissue is a mere temporary expansion of the protonema, the scaly leaves giving off rhizoids from their margins, so that by the time the capsule is developed, the gametophore has developed into a dense mass of protonemoid filaments. Other instances of reduction in the assimilative apparatus of the plant occur, in which reduction is compensated for to a certain extent by the persistence of the protonema. In such diminutive forms as *Ephemerum* (Fig. 1), *Schistostega*, *Discelium*, and *Nanometrium*, it persists until the fruit ripens, acting as a kind of foster nurse to the young gametophore. It supplies it with food, and by adding to the bulk of the plant colony, and thus covering a greater surface of soil, retards evaporation and assists in the conservation of moisture. Mr. H. N. Dixon suggests also, that it is of importance in preventing other plants from occupying the ground, and crowding out these dwarf species.[11]

Still more curious and marked examples occur in certain exotic Hepaticæ, in which, as Campbell observes, the protonema is permanent, and the gametophore only an appendage to it.[12] The dense filamentose protonema of *Protocephalozia ephemeroides*, discovered by Richard Spruce in Venezuela, bears small leafy bud-like gametophores, out of all proportion in size. Even more remarkable is the thallus-like protonema of *Lejeunia metzgeriopsis*, which resembles, as its name indicates, a species of Metzgeria. From the margin of this thallus-like body, leafy, bud-like branches originate, bearing the sexual organs. This very curious species was discovered by Goebel in Java, growing upon the leaves of epiphytic ferns.

There is apparently no morphological difference between the protonema and the tomentum or rhizoids which occur so abundantly on the stems of some mosses. In some species, they spring not only from the stem but from the leaves also, as in *Hypnum straminium* and *Hypnum fluitans*. In the latter they may be seen, even on a single leaf, arising from the apex, margins, and both surfaces of the leaf blade and nerve. (Fig. 3.) The rhizoids, however, are usually of a different colour from the protonema, and they are devoid of chlorophyll; but under exposure to light and moisture, they reassume the protonemal characters, become chlorophyllose, and are capable of emitting buds. The system of rhizoids forms an efficient water conducting and storing apparatus. In the Moss Associations already referred to, the *Sphagnum* plant has so specialised itself for an aquatic life, and has developed such perfect methods of safe-guarding its water supply by special modifications, that rhizoids are practically absent. The *Harpidia*, also, which have hardly emerged from a strictly aquatic life, produce them only sparingly. In the *Bryum* group, however, and in many mosses of decidedly amphibious habit and erect growth, this clothing of the stem is abundantly developed, often matting the stems together in a dense spongy mass. The plants are exposed to alternate flooding and exposure. As the water subsides, exposing the tufts of moss, the tomentum by capillarity ensures a good supply

of moisture to the upper parts of the stems, and thus it enables some species to grow vigorously when others have their progress partially checked by drought. As a result we may observe, in the *Bryum Association* already described, that *B. binum* and *B. pseudotriquetrum* are enabled to form large swelling tufts of great luxuriance. Other mosses which nearly always attain a greater prominence than their neighbours, in boggy places liable to periods of partial dessication, are *Aulacomnium palustre*, several species of *Dicranum* and *Campylopus*, *Philonotus fontana*, *P. calcarea*, *Paludella squarrosa*, *Cinclidium stygium*, and *Mnium subglobosum*. The densely tomentose stems seem to specially adapt them to the situations they affect. Many mosses which have entirely abandoned a sub-aquatic habit continue to produce abundant stem rhizoids, as for instance *Fissidens Curnowii*, and it appears to be a xerophytic device in the case of certain rupestral species of *Trichostomum*, *Weisia*, *Bryum*, *Eucalypta*, and *Bartramia*. This view is supported, in the case of the Hepaticæ, by Cavers, who found the rhizoids to increase in numbers in the xerophilous, and to decrease in hygrophilous forms of *Reboulia hemisphærica*.[9]

Another use of the rhizoids is to attach the moss-plant to the surface on which it grows, thus assuming one of the functions of true roots, which are of course absent in the Bryophyta. The rhizinæ insinuate themselves into the finest crevices and irregularities of the rock, fixing the plant securely. Some of the small tufted mosses cling by this means to the smoothest surfaces with wonderful tenacity. On rocks and boulders in the most bleak and storm-swept situations, where it would seem almost impossible for any organism to maintain its hold, the small alpine mosses and hepatics thus manage to brave the elements. Some of the species of *Cesia*, *Andreæa*, and *Grimmia* defy the severest storms which range around the summits of our highest mountains. Plants which grow in rushing torrents and rapid rivers have strong and firmly adhering rhizoids which will resist a powerful strain.

The reproductive properties inherent in the protonema are frequently exhibited in the rhizoids, and as they are capable of being emitted from all parts of the gametophore, and even from the sporophyte, this facility of return to active protonemal functions has been probably an important factor in the preservation of many species of moss which might otherwise have been unable to survive the stress of competition. These and other modes of asexual multiplication require special consideration.

B. The non-sexual methods of propagation are very varied in the Bryophyta, and can only be briefly noticed. The simplest form common in both hepatics and mosses, is the separation of young growing branches by the decay of older portions of the parent plant. This may be readily seen in many thalloid hepatics, excellent examples being *Reboulia hemispherica*, and *Riccia glauca*. These, owing to their dichotomous branching, form circular patches, which ultimately decay in the centre, and the living apical portions develop into separate individuals. *Frullania dilatata* and *Marchesinia Mackaii* also multiply in this manner. Some of the large aquatic Harpidia die down in winter, but in spring a profusion of young shoots arise from the prostrate stems, and ultimately develop into free plants. This occurs in *Hypnum pseudofluitans*, *H. Wilsoni*, and probably in others, and *Sphagnum* perennates in a somewhat similar manner.

Buds occurring on old stems sometimes remain dormant for a time, and after a period of rest resume active growth. This resting habit seems akin to the hibernation of animals, and serves to tide many mosses and hepatics over periods during which full activity would be impossible. When scorched by the summer sun *Riccia glauscescens*, *R. hirta*, *Fimbriaria californica*, and *Targionia hypophylla* appear quite dead and withered ; but the apices of the branches still live, and growth recommences with the return of moister conditions. In like manner some of the sand-dune mosses, especially such as *Tortula ruraliformis* and *Trichostomum flavo-virens*, which grow on the driest blown

sand, often seem to be quite dead. The older leaves probably never quite recover, but there are young ones nestling in the centre of the apical bud, waiting the return of favourable circumstances to resume activity. Some mosses when in this state of suspended animation are blown about by the wind and thus introduced into new habitats. *Weisia tortilis* readily detaches itself from the ground, and Mr. Dixon relates an instance of *Porstrichum alopecurum* doing likewise.[15] He states that the latter rolls into a ball, becomes free from the rocks, and readily blows about. It is possible that other mosses may be spread in a similar manner, and Mr. H. H. Knight sent me specimens of *Trichostomum tortuosum* from Whitcombe Wood, Gloucestershire, which had become freed from their attachment, and had continued to grow until they formed round balls, the original point of attachment disappearing from view.

Subfloral innovations in many hepatics and acrocarpous mosses rapidly multiply the plants by a kind of false dichotomy. The old stems decay and the innovations continue to grow, and finally become distinct individuals. These have a special chance of survival, and this method of reproduction is of more value almost than spore production, as the old plants have already cleared a space amongst competing growths, and their rotting remains mingled with dust and debris of insects and plants entangled in the rhizoids, assure them a good supply of food for their start as separate plants. These subfloral innovations may be examined in all our *Lejeuniæa* except *L. Holtii*, also in *Radula*, *Hygrobriella laxiflora*, *Eremonotus myriocarpus*, *Aplozia cordifolia*, *A. sphærocarpa*, *Lophozia bantriensis*, *L. ventricosa*, *L. gracilis*, *Southlya obovata*, and many other hepatics. In the mosses they are also common, as in *Fissidens Curnowii*, many *Grimmiæ*, *Bryaceæ*, etc.

Closely allied to this method are the production of special flagellate shoots, and the shedding of leaves. The latter is limited to a few species, the leaves of which, by an atrophy of the basal cells, have developed a high degree of fragility in their attachment to the stem, and simultaneously an ability to produce

protonemoid filaments from the nerve and leaf surface by which the species may be propagated. Many species of *Campylopus* (Fig. 4) and a few of *Dicranum*, in which fruit is rarely produced, exhibit these deciduous leaves. In only one or two, however, have I been able to trace filaments arising from the leaf, but no doubt these latter are able to produce fresh plants. *Campylopus flexuosus*, and one or two other species, have caducous shoots as well as deciduous leaves, and *Philonotis tomentella* and *Dicranum flagellare* produce remarkable axillary leafy shoots which are capable of growth when detached. *Plagiothecium elegans*, which has almost lost the habit of fruiting in this country, suffers no diminution in frequency on that account, as it propagates freely by axillary gemmiform branchlets, which are sometimes produced in such abundance as to quite alter the appearance of the plants. *Neckera pumila* produces small slender ramuli from the upper parts of the stem ; and another equally rarely fruiting species of the same genus, *N. complanata*, develops a profusion of flagelliform branchlets. Mr. Dixon regards Schimper's *var. tenella* of this moss as a stunted form in which all the branches are reduced to this flagelliform state, and Mr. Nicholson found *N. Besseri* so richly provided with filamentous branches as to almost obliterate the normal ones. Clusters of gemmiform branchlets often spring from the tips of the stems and from the leaf axils of *Leucodon securoides*, a dioicous species which would rapidly become extinct in this country but for asexual means of multiplication.

The leafless flagellæ often produced by hepatics seem to aid in fixing the stems to other plants amongst which they grow, but sometimes the flagellæ develop leaves and emit rootlets, and they are then able to propagate the parent plant. Such flagellæ are seen in *Lepidozia cupressina*, *L. repens*, *L. Pearsonii*, and in some *Cephaloziæ*. Also in *Herberta Adelanthus* and *Bazzania*. In the *Marchantiaceæ* branches are produced freely from the under surface of the midrib. These become detached and each forms a separate plant. Filamentous propagula spring from the nerve of *Distichophyllum carinatum*, and from the nerve and back of the leaves in *Amblestegium compactum*.

A few mosses which have to submit to keen competition among the luxuriant growths found in sheltered woods and on shady banks, succeed in overcoming other species, and at the same time propagate themselves, by sending up arching and proliferating shoots, which often develop rootlets at intervals and at their tips. This mode of extension may be seen in many species of the pleurocarpus genera *Hyocomium*, *Brachythecium*, *Eurynchium*, *Plagiothecium*, *Thuidium*, and *Hylocomium*. *Mnium undulatum* (Fig. 29) also affords an excellent example of this type, its mode of colonising strongly recalling that adopted by the Walking Fern (*Asplenium rhizophyllum*).

There are other more specialised modes of asexual reproduction which may be briefly noted as affording examples of apogamy in these plants. In *Aneura* Goebel discovered that true gonidia were expelled from certain cells of the thallus.[14] These gonidia differ from those of the algæ, from which the *Aneuræ* probably originated, in the absence of cilia, which is probably an adaptation to their more terrestrial habits. These gonidia are not found in any other group of the Bryophyta.

Simple unicellular gemmæ are produced freely by many species, principally from the marginal cells of the leaves, and in certain genera, as *Lophozia* and *Scapania*, they are of some diagnostic value. They may be observed in *Lophozia excisa*, *L. bicrenata*, *L. alpestris*, *L. Baueriana*, *L. gracilis*, *Anastrepta orcadensis*, *Leptoscyphus Taylori*, *L. anomalus*, *Cephalozia bicuspidata*, and *C. lunulæfolia*. In *Cephalozia Francisci*, *Odontoschisma denudata*, and several species of *Kantia*, they are collected at the apices of stems or branches. In *Tortula pusilla* and *T. lamellata* they are developed in special sacs borne on the surface of the nerve.

(To be continued.).

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PLATE I.—VOL. IV.

Fig. 1.—*Ephemerum serratum*, with protonema, x 20.
2.—*Buxbaumia aphylla*, entire plant, x 6.
3.—*Drepanocladus fluitans*, leaf with rhizoids, x 15.
4.—*Campylopus Schimperi*, ,, ,, x 15.
5A.—*Marchantia polymorpha*, x ½.
5B.—*Lunularia vulgaris*, nat. size.
6.—*Tetraphis pellucida* x 6 with gemma and paraphyses x 40
7.—*Orthotrichum Lyellii*, leaf with gemmæ x 15 and 40.
8A.—*Sphagnum papillosum*, trans. sect. of leaf cells x 90.
8B.—*S. medium* do. do. x 90.
9.—*S. laricinum*, trans. sect. of stem, x 180.
10.—*Catharinea undulata*, trans. sect. of leaf x 40.
11A B.—*Grimmia* and *Orthrotrichum*, do. x 90.
12.—*Pycnolejeunia ceylonica* x 10.
13.—*Aplozia cordifolia* x 10.
14.—*Petalophyllum Ralfsii* x 10.
15.—*Drepanocladus Rotæ*, basal cells of leaf x 180.

PLATE II.

16.—*Fissidens pusillus* x 10.
17.—*Schistostega osmundacea*, portion of "frond" enlarged.
18.—*Grimmia funalis*, appearance when dry x 20.
19.— do. do. wet x 20.
20.—*Brachythecium rutabulum*, grown in full light x 1.
21.— do. do. grown in dense shade x 1.
22.—*Bryum argenteum*, type; 23, *var. lanatum*; 24, *var. majus* x 15.
25.—*Mnium punctatum* antheridium and paraphyses, much mag.
26.—*Drepanocladus revolvens* x 5.
27.—*D. Sendtneri* x 5.
28.—*Tortula muralis*, showing modifications of leaf nerve x 20
29.—*Mnium undulatum*, with branches rooting at apices x ½.
30.—*Mn. rostratum*, showing dimorphous shoots x 1.
31.—*Cinclidotus pachyloma*, leaf x 17.
31A.— do. do. trans. sect. x 270.
32.—Stoma from capsule of *Orthrotrichum speciosum* x 180.

ZOOPHYTES:
THEIR LIFE HISTORY.

By Joseph Smith, M.R.I.A.,
Fellow of the Royal Society of Antiquaries, Ireland.

The Animal Kingdom is constituted of two great divisions or sub-kingdoms, Vertebrates and Invertebrates, the former embodying animals possessed of a vertebrate or backbone, the latter including all other animal forms upwards from the Protozoa. The lower types of animal life have, because of some peculiarity either in form or structure, offered a wide field for observation and speculation, and there is no one group, however small, but furnishes the microscopist ample material for serious thought and life-long study, in the variety of structure, and the various phases of evolution peculiar to the life history of the organisms the group is formed of. A feature we must not lose sight of, is the perseverance with which the early naturalists pursued the life history of these lowly forms of the animal kingdom, and the wonderful results consequent thereon; and we must none the less appreciate their labours, although many of the conclusions they arrived at we now know to have been inaccurate, since it is chiefly through these failures so much good has propagated on the interest they originally excited.

The Hydroids, that group of animals commonly spoken of as Hydroid Zoophytes, only one remove in the ladder of life from the Protista, were well-known and studied long before the time of the great Linnæus, who established them in the genus Zoophyta, *i.e.*, life-bearing. The term "Zoophyte" is, however, a misnomer, and only used to convey a general idea of these peculiar forms of minute life which "judged from their appearance alone, would often almost justify the application to them of the term in its literal sense, for, widely separated as the classes are, they are, as a rule, studied together," and although the term now does not possess any special meaning, it is used to specialise those animals which are included in the groups Hydrozoa, Actinozoa, and Polyzoa.

When we glance back at the labours of our predecessors in the earlier centuries, we find Aristotle writing of "*partes similares et dis-similares*"; we meet with Fallopius, who dissertated on the form and function of tissues; with Leeuwenhoek and Rusch, who discussed embryology; with Luberkulm, Fontani, and Hewson, who demonstrated histology; yet notwithstanding all the knowledge which had accrued respecting the life cycle of hydroids, it was small and conflicting. Prior to the 16th century these animals were considered to be of vegetable origin by botanists, but were by mineralogists claimed as objects of the mineral world. Each party strove to substantiate the claim, and a bitter contest was the result, so much so, that it has been doubted whether Ferrante Imperatore, who enjoys the reputation of having, so far back as the year 1599, demonstrated the animal structure of these lowly types of life, fully understood the nature of his discovery. De Blainville openly asserts he did not, but Lamouroux suggests that Ferrante, not having a distinct idea of their animal nature, continued to regard them as of vegetable origin.

Peysonel exposed this vegetable fallacy about the year 1729, while Jussieu in 1742 clearly demonstrated that *Alcyonium digitatum*, *Tubularia indivisa*, *Flustria foliacea*, and *Cellopora pumicosa* were productions of a marine animal. Unfortunately Marsigli, an eminent Italian naturalist, who had made a special study of corals, about that time published his great work in which he speaks of the polyps as the "Flowers of corals." This assertion, coming as it did from a naturalist who enjoyed a Paneuropean reputation, only tended to increase opposition against acceptance of the theory of animal origin, and the result was that it debarred Peysonnel's paper, demonstrating the animal origin of Hydroids, from the Academy of Sciences at Paris. A peculiar feature in this discussion was the attitude assumed by Reaumur, who obtained the loan of Peysonnel's paper. Struck with the great feasibleness of his friend's arguments, he admitted that Hydroids did belong to the animal kingdom. Suppressing, however, the author's identity, he

himself read the paper before the Academy. at the same time repudiating the adoption of such a theory on the ground that it was monstrous and untenable, and directly opposed to existing laws. No further attempt was made to prolong the acrimonious discussion, and it lay in abeyance until some years afterwards a London merchant, John Ellis, a naturalist very indifferent to the surrounding impressions on the subject, boldly asserted that Hydroids were animals, adhered to his statement, and demonstrated them to possess bodies of a similar structure to the Hydra.

Ellis was a friend of Linnæus, and frequent communications passed between them on the subject, yet Linnæus would never endorse the views of Ellis, but established the separate order "Zoophyta" to include "*plantæ vegetantes, floribus animantis,*" a definition which is taken to signify that the outer structure was vegetable, but that the polyps inhabiting the stems and branches were animals; and he enters a very curious defence of his reason for adopting this dual structure for the Hydroids. It is this: "Plants on *terra firma* enjoy the motion of the air; that as in the depths of the ocean there exists perfect and undisturbed quiet, the Creator had endowed the terminal portion of the Zoophytes with a nervous system and power of motion, that they might by their own action partake of the enjoyment which the quiescent state of their watery abode could not supply."

The Hydroid Zoophytes known now as Hydroida belong to the Coelenterata, hollow-bodied animals, possessing a sac, which is sometimes called the gastrovascular cavity. They are metazoa, *i.e.*, animals constituted of an aggregation of cells arranged in a differentiated form, some of which are external, *e.g.*, those of the ectoderm; others internal, those of the endoderm. A protozoon as opposed to a metazoon consists of one cell only, and so remains through life, simple propagation taking place by division of the cell, but in the metazoa certain cells give rise to other cells, which arrange the functional duties for the propagation of the species.

The characteristic of this group is the possession of a polipary, virtually a sac, by one end of which called the posterior end, the animal adheres to its support, while the oral opening at the opposite end, called the distal end, is more highly differentiated. This leads to the digestive cavity or sac itself, which extends through the whole length of the animal, and is at the apex surrounded with a circlet of organs termed tentacles. The wall of the sac is composed of two layers of tissue or cellular membrane, the outer one the ectoderm, the inner one the endoderm. The ectoderm is the stouter of the two, being exposed to external influences which surround it and affect it, while the endoderm from the position it holds in the order of functionary powers, is free from such influences as affect the outer membrane. The cavity composed of the amalgamation of these two membranes, so well illustrated in the freshwater group, extends the whole length of the animal, and is surmounted by a row of tentacles. The inner membrane may be compared to the epithelium of the alimentary canal in the higher animals, for it assists in the function of digestion, and is richly ciliated for the purpose of keeping up the circulation of particles for the nourishment of the animal. The cells of the endoderm may be classified as two kinds—round, and conical vacuolated ones. It is from this inner layer the tentacles originate, and Weissman contends that the circulatory motion which the tentacles when actively engaged in search of food give rise to in the somatic cavity, is also assisted by a pulsation of the body wall.

The Hydroids are not exceptions to that peculiar feature commensualism, or communal partnership, which is known to exist in other groups of the animal and vegetable kingdoms, and termed symbiosis. Amongst animals this partnership is often set up from an instinct of self-preservation, and, curiously, the partnerships are formed not amongst members of the same species, but between organisms of the most diverse kind. The most illustrative, and at the same time the most remarkable, is the association of a sea anemone with the hermit crab.

(To be continued.).

NEW LANCASHIRE LICHENS.

By Albert Wilson, F.L.S.

Since the discovery in West Lancashire of *Lecanora Prevostii* Fr. and *Lecidea excentrica* Ach. (see paper by J. A. Wheldon, F.L.S., in this Journal, September, 1910, p. 192), two other interesting species have been added to the county list.

In August of last year, whilst botanising in the neighbourhood of Ease Gill Kirk, close to the spot where Messrs. Hartley and Wheldon discovered the above-mentioned Lecanora, which plant I was glad to find in considerable quantity, I came across *Urceolaria gypsacea* Ach This lichen, which forms a thickish white crust on the surface of the rock, recalling, as its name implies, a coating of gypsum or plaster of Paris, grows on the vertical limestone cliffs in the gill, where it seems to prefer rather deep shade. It differs from the common *Urceolaria scruposa*—of which it has been considered by some authors to be a variety—in the creamy white and softer thallus and in the negative reaction of the medulla with iodine. The apothecia are urceolate and immersed, and similar to those of *U. scruposa*. They were freely produced in the locality. The plant has been recorded from a few places only in Britain, mostly in the South and West of England, occurring on chalk and limestone rocks. It is, however, rather inconspicuous, and being easily overlooked it may be much commoner than the records indicate. Just recently (March, 1911) I have found it on limestone cliffs near the summit of Farlton Fell, in Westmorland, v.c. 69.

The rich limestone district about Silverdale has yielded many rare and interesting plants, several uncommon lichens being included in the list, and to these latter must now be added another. In November, 1910, I found *Lecanora verrucosa* Nyl. growing on dry stony ground amongst limestone rocks on Castlebarrow, the hill to the north of the village. So far as I know, it has previously only been recorded from one locality in England (Cunswick Scar in Westmorland), and from a few places on the Scottish Grampians of Perthshire. It usually has a distinctly subalpine or boreal range of distribution, but the

Silverdale locality is only 250 feet above sea level. The thallus, which has a negative reaction with caustic potash and also with chlorinated lime, is white or greyish white, and more or less farinose. The young apothecia are imbedded in the thalline verrucæ, externally having the appearance characteristic of a *Pertusaria*. Later they assume a somewhat *Urceolaria*-like appearance, and finally become flat, showing a distinct proper margin inside the thalline one. They are somewhat pruinose and blackish in colour, and contrast somewhat strongly with the white thalline margin. The spores are simple, oval or ellipsoid in form, and very large for those of a *Lecanora*, measuring about 0.052mm. long by 0.028mm. wide. My thanks are due to Mr. J. A. Wheldon, F.L.S., for kind help in the determination.

UNITED FIELD NATURALISTS.

At the quarterly meeting of the United Field Naturalists, held at Shaw on March 12th was read a communication at the morning meeting on "Some phases in the life history of *Difflugia pyriformis var. viridis*, and *Centropyxis aculeata*, illustrated by diagrams. The phases which Mr. Beaumont described and illustrated he contended were new to science, and had never been described. The green variety of *Difflugia* was the original source of Mr. Beaumont's observations on the "spore-bearing amœba," and he contrasted this organism with *Centropyxis*, with a view to showing that the changes he had explained were similar to those occurring in the latter organism.

At the same meeting Mr. Abel P. Bradshaw was responsible for a nice exhibition of diatoms. At the afternoon meeting Mr. Fred Taylor, of Oldham, delivered an excellent lecture on "The Nesting of British Birds," this being greatly aided by a choice selection of lantern slides which were shown by Mr. Tom Taylor.

THE DEATH'S HEAD MOTH.

(Acherontia (Manduca) atropos L.*).*

ITS LIFE HISTORY, DISTRIBUTION, AND FOLKLORE.

By R. Standen.

(Continued from page 402, vol. 3).

Remarks on Folklore, Hive Robbing, etc.

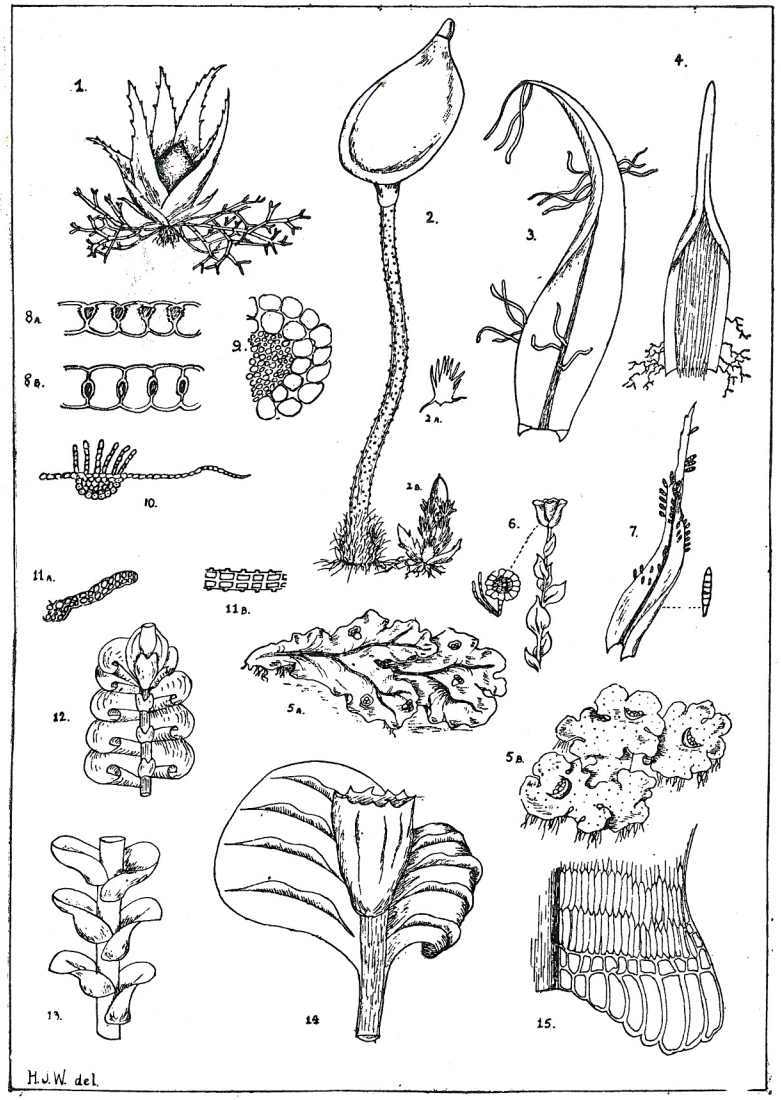
One can hardly wonder that a creature endowed with so many startling characteristics as the Death's Head should be an object of so much superstitious alarm to ignorant country folk. Its large size, powerful flight, the weird skull-like mark on the thorax, and the peculiar cry it emits, have all conspired to render it an object of dread and ill-omen. It is looked upon as an agent of the evil spirits ; the very shining of its large and brilliant eyes is believed to represent the infernal element from which it is supposed to have sprung. Its habit of flying only in the morning and evening twilight, serves but to accentuate the unfounded fear. In different parts of Europe, where it sometimes occurs in immense abundance, whole communities have been terror-stricken, believing it to be a harbinger of war, famine, pestilence, and death. In German Poland it goes by the names of "Death's Head Phantom," and "Wandering Death's Bird." In the Isle of France the opinion was once general amongst the common people that the dust shed from its wings when flying about a room would produce blindness if it happened to fall on the eyes.

Latreille tells us that it appeared in Brittany one year in great numbers, and as at this period an epidemic malady was raging with great violence, the mortality was attributed by the ignorant to this harmless moth.

F. Gibson (*Superstitions about Animals*, p. 168, 1900) says : "Quite recently I heard of a country woman who was afraid to cross a common 'for fear of the Death's Head moths stinging her.'" The locality would be, judging from the preface, Bishop Auckland, or thereabouts. In *Folklore*. Sept., 1900, p. 344, Miss L. A. Law remarks, dealing with "Death and Burial

Customs in Wiltshire": "Various omens were believed to foretell death. It was believed that a death was soon to occur in the family, if anyone brought into a house the caterpillar of the Death's Head Moth."

Diligent enquiries, in many directions, seem to indicate that any lingering traces of superstitious ideas connected with the moth at the present day in our district are few and far between, if, indeed, they have not altogether died out in most parts. This may be due, in part, to the spread of education, which has done so much to dispel the myths and superstitions formerly so common amongst the country folk, and partly to the fact that the moth has rarely occurred in sufficient abundance, here in the north, to attract much notice. It is only a few very old people in remote country places who remember hearing, in their youth, that this insect was a harbinger of ill. Personally, I can only recall one incident bearing upon the point. This was a good many years ago, when I was told of a Death's Head flying into a bedroom, in which lay a sick child in a very critical state. The incident threw the mother into a frenzy of inconsolable grief, she being told by an old woman neighbour, who happened to be in the room at the time, that it was a sure sign of the child's death. Fortunately, the child recovered; otherwise, as a matter of course, it would certainly have resulted in the perpetuation of the superstition in that particular neighbourhood. It may be worth while mentioning here, as having, perhaps, some remote connection with the general superstition respecting the Death's Head, that in most parts of North Lancashire the presence of any of the larger moths—locally known as "Buzzarts"—in the house is, or was when I was a boy, looked upon with disfavour by some country folk. I remember being present on several occasions when the sudden entrance of a large moth, such as the "Old Lady" (*Mormo maura*), a species which frequently enters open windows at night, attracted by light, has roused everybody in the room to an energetic endeavour to eject the intruder, and someone was certain to enjoin us to "Shoo it out, and don't hurt it." If the moth refused to leave by door or window, in response to much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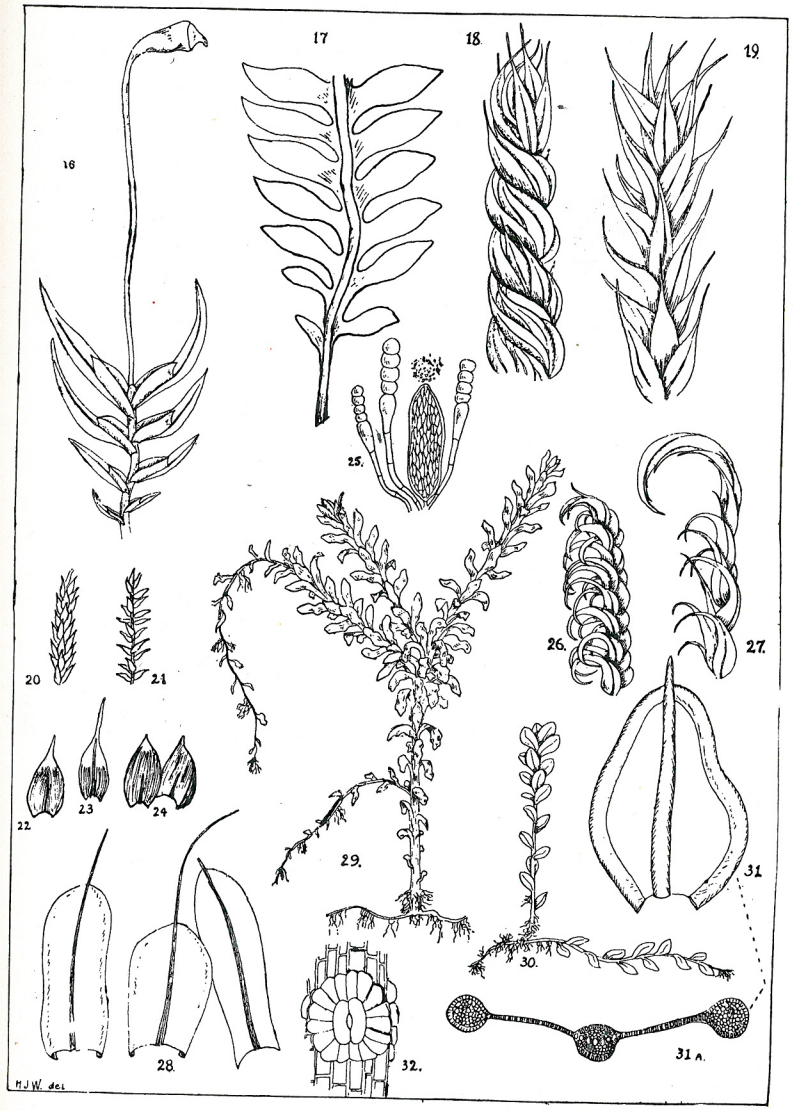
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vigorous flapping of aprons, etc., when ultimately captured it was invariably handled tenderly, put outside the house, and allowed to fly off. I have seen old people solemnly shake their heads at such times, and remark, "That's a bad sign!" But I could never ascertain what particular calamity they thought was likely to follow the incident.

In the course of communications respecting the Death's Head, my friend Captain Farrer, of Bassenthwaite, relates the following curious incident:—"One Thursday in the month of November, 1905, one of our maids went to visit her parents in the village, and on her return in the evening brought to me a live Death's Head Moth, crammed into a match-box. She said that it had flown into their next door neighbour's house, and when they drove it out—thinking it was a Bat—it flew into her parents' house, and her father caught it and sent it on to me. When the girl handed the moth to me, I laughingly said, "Oh! Sarah, this is an unlucky thing for you, as someone is sure to die in your house now" I little dreamt how soon my words would, in a way, come true! On the following Sunday one of the neighbours' daughters, a girl of 18, died suddenly, after a few minutes only of illness; and on the Monday following a telegram came to say that Sarah's sister had been burnt to death that morning at Cockermouth! So that each of the houses visited by that unlucky moth lost a daughter within a few hours of its visit to them. Of course all this was purely coincidence, but you may be sure that Death's Head Moths are now looked at very queerly by the Bassenthwaite folks."

Mr. R. Cottam, of Oldham, writing to me relative to local superstition, etc., in connection with this insect, says:—"I notice in speaking with the country people hereabouts, that it is only the older folk who now speak of it with forebodings, but I do not hear from anyone of its being regarded as a forerunner of death in the household. Many people, however, look upon its appearance as indicative of a bad honey-year, and ill-luck with their bees. One veteran bee-keeper's account, given in all seriousness, amused me greatly, and is too good to pass by.

The old gentleman assured me that the Death's Head used to get into his hives ; frightening all the drones and workers away by its hideous groans ; killing the queen bee, and then helping itself to the honey, After satisfying its own appetite it would then carry off a large supply to feed its young ! Some years not a single moth would be seen, and these were always the best honey years ; but some years the moths came in great numbers, and these were the years their (the moths) honey store was very small, and they came to rob the bees ! "

The Death's Head is said to have a partiality for the sap exuded from wounded trees—which is well-known to be an attraction to other species of moths. Whether it sucks food from flowers is not quite clear, but the unusual shortness of its proboscis, or " tongue," seems against this. The proboscis is but 14 or 15mm. in length, which would make it a convenient instrument for sucking honey from the cells of honeycomb. That the moth keenly appreciates honey there can be no doubt, and that it does enter beehives to filch honey from the bees is an established and long-known fact. Tutt (*Brit. Lep.*, pp. 441-444) quotes a large number of circumstantial and well-authenticated instances of this propensity, as observed in this country, and more particularly on the Continent, where it has been known in certain districts to completely ruin the apiaries. But it is never likely, in this country, to become plentiful enough to do much harm ; moreover, the modern style of hive would keep it out. In some cases bees have been known to attack and kill the intruder, afterwards—it being too bulky an object for them to eject from the hive—embalming it completely in wax. At other times they endure the intrusion passively and this has inclined some observers to conclude that the hostility of the bees has been disarmed by the squeaking of the moth, in a manner similar to their control by the voice of their queen. According to some Continental bee-keepers, bees, in districts where they are subject to the attacks of the moths, will, if they are kept in the old-fashioned straw-skeps, erect a barrier of wax at the entrance which the moths cannot pass.

I have not been able to gather much local information bearing upon the robbing of beehives by the Death's Head in our district, but what little I have to relate is not without interest.

My first introduction, as a very small boy, to the Death's Head was made through finding a much battered specimen lying dead under the stage of one of my grandfather's skep-hives. This, a great event to me, occurred at Goosnargh during the summer of 1863. Whether the moth had attempted to enter the hive, and been stung to death by the bees, of course I cannot say, positively, but it is extremely likely. On showing my specimen to various people they were unanimous in pronouncing it to be a " Bat," and declaring that it had been trying to get into the hive and steal honey. I do not recollect any remarks being made either at this time, or subsequently, by any of the neighbours as to its being an "unlucky" thing. Another incident in this connection may be worth relating. Some two or three years after the above event I well remember one of the villagers, who kept bees, coming in to borrow a gun and some charges of powder and small "dust-shot," to shoot—as he expressed it—" Some danged bit-bats wot wor buzzin' abaat th' hives ; fleyin' th' bees to deeath ; an' tryin' to creeap in an' steyl th' honey." I forget what success the man had, but it is very likely some innocent bat suffered instead of the real delinquents, for I have now little doubt that the " bats " he had seen hovering round his hives in the dusk were Death's Head moths.

Several instances are recorded by Tutt *(loc. cit.)* and others, of the moth being captured with its abdomen distended with honey. A clergyman with whom I am acquainted, Rev. E. W. Bowell, obtained a fine imago in 1908, from which he took quite a teaspoonful of honey whilst preparing the insect for the cabinet. Mr. G. A. Dunlop informs me that a specimen, now in the collection of Mr. W. Mounfield, was captured at Acton Grange, near Warrington, whilst in the act of gorging itself with honey in a bee-hive. Although the moth was almost smothered by a crowd of infuriated bees, it was feeding away apparently quite oblivious to their stings.

In conclusion, I must heartily acknowledge the kind responses to my appeals for aid in the compilation of the list of records, etc. In only a few isolated cases has my polite enquiry (accompanied by a stamped addressed envelope) been—from some incomprehensible motive—altogether ignored. Had the jealously guarded habitat of some established rarity been sought, one could have understood, and applauded, such reticence, but in this case there is no such excuse. I can only account for this indifference, by putting it down as a relic of the spirit too often exhibited by some of the old collectors, who so jealously kept their knowledge to themselves. It is pleasant to think that these " dog-in-the-mangerish " ideas are now practically extinct, amongst the broader-minded naturalists of to-day. Numerous friends have freely placed at my disposal all the information they possess, and thereby enabled me to record, for the first time, many hitherto unnoted occurrences, and for their kind help I would here tender, to one and all, my grateful thanks.

NOTE.—The *top line*, page 401, vol. 3, has been transposed; it should follow the *bottom line*, page 399.

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At a meeting of the United Field Naturalists on March 12th, held at Shaw, a very interesting collection of mosses was shown by Mr. Kent. These had been collected by the late Mr. John Nowell, of Todmorden, and full data was attached, showing that they had been gathered at varying periods from 1834 to 1850. The greater proportion were obtained in the area covered by the *Flora of Todmorden* which recently appeared in our pages, and in which Nowell had a great share in the compilation. Possibly some of them were the specimens which aided in the compilation of the records.

—o—

The *Proceedings of the Liverpool Naturalists' Field Club* for 1910, just to hand, contains the usual interesting information in relation to the rambles and to the botanical work of the year. An excellent portrait of Dr. Ellis accompanies the work. The Society owes much to his zeal.

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Notes on Arachnids observed during 1910.

A. RANDELL JACKSON, M.B., D.Sc.

II.—GENERAL NOTES ON SPIDERS FOR 1910.

The following rare or interesting spiders have come under my notice during the past year :—

Dicœa dorsata Fabr.—Immature individuals were very abundant on foliage at Box Hill on September 11th.

Xysticus luctator L. Koch. — A splendid male was found running on a path in the New Forest on May 29th.

Xysticus robustus Hahn.—Several males and a single female were found in June in a sandpit near Matley Passage in the New Forest. This pit acts as a sort of trap, the animals falling, or crawling in, finding it very difficult to get out. I suppose they *must* get out, or else be devoured by enemies whilst in the pit, otherwise they would accumulate there. Large numbers of common spiders were found in the pit each day, but curiously enough the examples of *X. robustus* were all found in at one time and no others were seen at any other time. In 1909 Mr. H. Donnisthorpe, who kindly showed me this curious place, found in the pit both this species and the last, and my example of *X. luctator* above recorded was found quite close to it. Very careful search amongst the surrounding heather was quite unavailing.

Philodromus margaritatus Clk.—An adult male on the trunk of a fir tree on May 29th, and an adult but parous and shrivelled female on an oak branch on May 30th. Both were of the typical form, and both were taken in the New Forest. The dates appear to be rather late.

Philodromus rufus Walck.—Widespread but not abundant in the New Forest during the first half of June.

I beat about three dozen adults from oak branches in about ten days. The small size, delicate colouring, and slim, elegant form of this animal distinguish it at once from its congeners. When in the umbrella it flattens itself out very much more than they do, and it is just as swift of foot as any of them.

Philodromus elegans Bl.—Females in the New Forest in June, and an immature example swept from heather at Oxshott on September 12th.

Dictyna variabilis C.L.K.—Two males and a female of this unmistakeable species were obtained during 1909 by Mr. R. S. Bagnall in a wood near Gibside, County Durham.

Ballus depressus Walck.—A female was taken at the same locality and at the same time as the last species. Mr. Bagnall was the captor.

Eugnatha striata L. Koch.—An immature example of this spider arrived at my house in the same tube as the last two species. Mr. Bagnall found it in the same wood and at the same time. These three records are very unusual, the two first being typical southern animals occurring fairly abundantly in the south of England, but not known to exist north of the Midlands. The last species has occurred in Dorset, Norfolk, and Sligo, but is extremely rare.

Tetragnatha pinicola L. Koch.—Several adult examples were beaten from long heather growing in a ditch in the New Forest in June.

Singa albovittata Westr.—Mr. Britten obtained females of this species by sweeping heather on Wanfell, near Penrith, during the summer.

Singa pygmæa Sund.—Two females were captured by Mr. J. N. Halbert at Louisburgh, County Mayo, in July, 1910. These were sent to me by Mr. Pack-Beresford. The structure of the sexual organs easily distinguishes this species from the closely allied *S. sanguinea* C.L.K.

Epeira umbratica Clerck.—An adult male swept from heather at Burnham Beeches on September 10th.—The situation is rather unusual, and may possibly help to explain why the adult males of this common species are often so hard to find.

Epeira dromedaria Walck.—Immature examples of both sexes were swept from heather at Burnham Beeches on September 10th. Several, including both males and females, were brought home alive. They fed readily on minute Diptera and Homoptera during October and November. At the beginning of December they hid themselves amongst dry leaves, and at the present moment (January, 1911) are still alive, though keeping very quiet. I am anxious to ascertain when the males become mature, as they are apparently over at the end of Mav.

Ero tuberculata De Geer.—Three males and a female swept from heather, or beaten from Scots pines at Oxshott on September 12th. Two specimens of their remarkable egg cocoons were found. These are shaped like a fat cigar or a modern dirigible balloon and are attached to heather twigs by means of a very long strand of silk. The species had previously been found in Britain at Bloxworth, and in the New Forest.

Ero Cambridgei (Kulcz.).—I have found in my collection several examples of this species recently described by Kulczynski.[8] One female was found in the New Forest, and another in Cheshire, whilst a male and several females were found with numerous examples of *E. furcata* Vill. in a bottle with no locality label. The species is probably widespread in Britain, as Mr. F. Cambridge had sent specimens from Dorset to Professor Kulczynski.

Laseola tristis Hahn.—Mr. Wallis Kew obtained a female at Killarney in June, 1910, and kindly sent it to me. It is undergoing its last moult, and hence is swaddled in its old cuticle, but Mr. Cambridge, to whom I sent it, says it is quite determinable.

Asagena phalerata Panz.—An adult male was taken at Braemar by Mr. Donnisthorpe, and another by myself in the New Forest sandpit.

Coryphæus simplex F. Camb.

Coryphæus fortunatus Camb.—Mr. Britten found an adult male of each of these species at Anthorn, near Silloth, in Cumberland. The specimens were captured amongst dead grass just above high water mark on September 4th, 1910.

Syedra pholcommoides Camb. — A female amongst fallen leaves at Box Hill on September 11th.

Hypselistes Jacksonii Camb.—Both sexes were swept from rushes growing in a swamp at Burnham Beeches on September 10th. In October I obtained several females from Delamere Forest, and in December Mr. Britten sent me specimens of both sexes from Penrith.

Tigellinus furcillatus Menge.—A male in the New Forest on June 9th, and a female at Burnham Beeches on September 10th. Both specimens were found amongst moss.

Tmeticus affinis Bl.—Both sexes amongst water weeds on the banks of the Gowy, near Chester, on September 27th. Several immature males were found, and I fancy that spring will turn out to be the best time for that sex.

Oxyopes heterophthalmus Latr.—Adults of both sexes were obtained on June 2nd and June 7th in the New Forest. They affect an extremely restricted locality near Mark Ash, where they are to be found in a heathery glade. Their colours harmonise very well with their surroundings. Altogether nearly two dozen adults were taken, most of which were females.

Uloborus Walckenaerii Latr.—Several males and a single female were swept from heather in the same locality as the Oxyopes.

Hyptiotes paradoxus C.L.K.—In early June I paid some attention to the New Forest haunts of these animals. I found a considerable number of specimens but all quite young; none were more than half-grown. They occurred in the old Brockenhurst locality, at Tantany Wood, Emery

Down, and other places, and always in the same prickly thickets. I never succeeded in finding their snares. Two males were brought home alive and confined in glass jam pots. I tried various insects on them as food, and found they were most partial to the rose aphis, which they would eat freely. They formed irregular but roughly triangular webs in their jars. These were calamistrated in places but very irregularly, no doubt the cramped locality, and the absence of suitable currents of wind prevented them from spinning typical snares. The spiders' attitude was always the same—back downwards and head towards the snare. Theysupported themselves by a thread attached at one end to their spinners, and at the other to the trap line, and by means of their first pair of legs which tightly grasped the trap line. I never could see any coil of slack in connection with the trap line, but one spider when disturbed used to jerk himself forwards towards his snare, so there probably was a little. In wrapping up an aphis the second and third pair of feet held the prey, and the sheets of silk were manipulated by the fourth pair and of course the spinners. One of these spiders died, but the other became adult on July 17th.

On September 11th Mr. Wallis Kew and myself came across this species again at Box Hill. We beat a pair of adults and one or two young individuals. Very careful search failed to reveal snares. The spiders here occupied a thicket of yew and box, very preferable to the painful localities affected by the species in the New Forest. The only previously known localities in Britain for the famous triangle spider were Cumberland, the New Forest, and Killarney.

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8.—Fragmenta Arachnologica, 1911, pp. 61, 62. Pl. II., figs 78, 81, and 82.

Mr. Jas. Lomax recently delivered a paper before the Manchester Geological Society bearing on the microscopic examination of coal sections.

THE BIRDS OF OLDHAM.

By Fredk. J. Stubbs.

(Continued from page 412, Vol. 3).

Turnstone. *Arenaria interpres* (L.).—In my former list I recorded one that had been shot at The Hague, Longdendale, in 1901—the first record for Derbyshire. Stott mentions it for Hollingworth. I have heard local gunners describe the bird under the expressive name of "Tortoiseshell Plover."

Oystercatcher. *Hæmatopus ostralegus* L.—Many years ago Allis recorded two for the Marsden moors (*Birds of Yorkshire*, p. 587); and Stott mentions another shot at Hollingworth, February 12th, 1874.

Grey Phalarope. *Crymophilus fulicarius* (L.). — I have examined one in winter plumage that was shot at Cutler Hill, Hollinwood, about 1860. Barlow has stuffed several, including one in summer plumage caught on the canal at Failsworth. Amongst others may be mentioned Stott's record—"January 2nd, departs January 10th."

Dunlin. *Pelidna alpina* (L.).—I have already described the status of this species near Oldham (*Lancashire Naturalist*, ii, 243-48), and shall do no more now beyond saying that it breeds on certain moors within my radius, and visits the lowlands occasionally.

Little Stint. *Limonites minuta* (Leis.).—Barlow caught one on a pond at Newton Heath in 1889, and Mitchell quotes Davenport in recording four that were shot on Bury Reservoir on the 14th September, 1870.

Pectoral Sandpiper. *Heteropygia maculata* (Viell.).—Grindon (*Man. Walks*, etc., 1858, p. 157; and *Country Rambles*, 1882, p. 287) mentions one shot beside a pit near the White House, Stretford Road, Manchester.

Purple Sandpiper. *Arquatella maritima* (Gm.). — One at Hollingworth (Lancs.), and another shot at Bury by George Holt, of Elton, December 8th, 1871 (*Bury Rep.*).

Knot. *Tringa canutus* L.—Stott lists this bird, and I have seen at least two local specimens, both in winter plumage. One had been killed at Alkrington, and the other at Diggle. The last is in the possession of Mr. G. Binns, of Springhead.

Sanderling. *Calidris arenaria* (L.).—Barlow received several from Newton Heath, and Davenport stated that it was sometimes common on the Bury Reservoir.

Redshank. *Totanus calidris* (L.).—There are many records for the district, and probably this increasing species may some day attempt to breed in the wilder moorland localities.

Greenshank. *T. fuscus* (L.).—Mr. W. Lees shot one at Pitses in 1905, and his father has another killed there about 1870; the second bird is immature. Stott includes it in his list, and I am inclined to believe that this noisy wader is often seen but not recognised during the autumn migration.

Wood Sandpiper. *Rhyacophilus glareola* (Gm.).—One shot at Droylsden in 1876 (*Naturalist*, 1898, 334).

Green Sandpiper. *Helodromas ochropus* (L.).— A frequent autumn visitor, and oecurring occasionally in spring. Blackwall mentions one under May 7th, and in the middle of April, 1909, I had one under observation for some days near Oldham (*cf. Lancashire Naturalist*, ii., p. 49).

Ruff. *Pavoncella pugnax* (L.).—In 1906 Mr. Joel Sidebottom, of Matley, told me that ten years previously he had shot two "frilled" Ruffs on the Etherow at Mottram. They were stuffed by the local barber, and subsequently passed into the hands of Mr. James Booth, who allowed me to examine them. I came to the conclusion that they had been stuffed from the flesh and not from skins; and also that they had passed some days in a smoky district, for the feathers bore the characteristic local stains. Mr. Jos. Middleton, late of Hodge, whose local knowledge I know to be useful in these matters, credits the occurrence; but I am not so sure about

other birds reported to me as seen and not procured at the same place in 1903 and 1904. Here and there in the district one comes across cases containing usually eighteen Ruffs in perfect spring plumage. The birds are in three rows, each specimen facing exactly the same way. Mr. John Taylor (whose long and curiously minute experience of local taxidermists has been of great service to me) says that these were commonly supplied by "Old Jesse," of Chadderton, at one guinea per case! Preserved Ruffs are common near Oldham, but often they lack data. A frequent name for them is "Lincolnshire Ruffs."

Common Sandpiper. *Tringoides hypoleucus* (L.). — Sand Snipe. Summer Snipe Jack Snipe. A very common nesting species on nearly all the moorland reservoirs, and along the banks of some of the streams. During the autnmn it haunts the polluted lowland rivers.

Bartailed Godwit. *Limosa lapponica* (L.).—Mr. James Dixon, of Waterhead, has allowed me to examine an adult female Bartailed Godwit in winter plumage shot by himself near the Scouthead Mill about 1876. It had been stuffed by Broadbent. Blackwall, and also Nicholson (*Brit. Assoc. Handbook*, 1886, p. 46) refer to the species for the Manchester district.

Curlew. *Numenius arquata* (L.)—Still nesting each summer on several moors within our radius. Throughout the rest of the year it occurs, sometimes in large parties, on the rough pastures at the edge of the moorlands; and in spring and autumn odd pairs may be expected throughout the district. Some nights they are very noisy. On that of April 10th, 1908, just before midnight, great numbers were calling as they passed close above the house-tops in the centre of Oldham.

Whimbrel. *N. phæopus* (L.).—On Stott's Hollingworth list.

(To be continued.).

REVIEW.

THE WOODLICE OF IRELAND: THEIR DISTRIBUTION AND CLASSIFICATION.

By Denis R. Pack Beresford and Nevin H. Foster. Proc. Roy. Irish Acad., vol. xxix., sect. B., No. 4, pp. 26, 1pl. 8vo., 1911. Dublin: Hodges, Figgis, and Co. Ltd. Price 6d.

Although without any special reference to our district, we should like to draw the attention of those of our readers who are at all interested in faunal distribution, to this admirable compilation. We must heartily congratulate the authors upon a praiseworthy piece of work, which we should be glad to see emulated by our own local naturalists. In glancing over the long list of Irish naturalists who have assisted the authors by sending them specimens from all parts, we cannot help contrasting it with the indifference exhibited towards this interesting group of animals by the bulk of our local collectors. We understand that not a single response has been made to the special appeal for help with this group, which appeared in this journal, February, 1910; and it is somewhat mortifying to think that so many members of our numerous local societies will persist in dissipating their energies exclusively along well-worn grooves, to the neglect of other subjects, well worthy of attention, in the study of which they could easily assist with a minimum of trouble to themselves. In the standard work on British Woodlice, by Webb and Sillem (1906), TRICHONISCUS ROSEUS, from Grassendale, near Liverpool, is the only species recorded for Lancashire—a record made, moreover, by an Irish naturalist when over here on a visit, and published in an Irish journal! One other species is given from Matlock and Arnside. These, with two others from Chester, and one from Warton, recently recorded in this journal, appear to represent the sum total of records for our district. The Irish list is otherwise so full and complete that we are surprised to read of PLATYARTHRUS HOFFMANSEGGI that . . . . . "in Great Britain it is apparently more or less a southern species, not having been taken further north than Oxford." Yet in the Bibliography, at end of paper, we note the inclusion of Mr. R. Standen's paper on this species, published in this journal for November, 1909, giving Lancashire, Yorkshire, and Lincolnshire records. With this, probably inadvertent, exception, we have nothing but praise for our Irish friends' achievement, and heartily commend it to our readers on this side the Channel. The paper is well illustrated by a plate of species new to Ireland, and distributional maps of a novel character; tables of generic and specific characters are also given, which should prove exceedingly helpful to would-be collectors of our British Woodlice.

WITH THE SOCIETIES.

The Solar Spectrum.

At the April meeting of the Prestwich and Pilkington Botanical Society, with other botanical exhibits, a quantity of highly-coloured examples of *Primula vulgaris* from Mr. Price, of St. Asaph, were shown. Mr. A. Stansfield contributed a paper on "The Solar Spectrum," this being prompted by a previous paper by Mr. T. E. Hoyle, on "Photo-synthesis." The character of the different rays came in for consideration, as well as the chemical rays. As we had been able through the labours of the illustrious Humboldt and others, quite long ago, to mark on our planet the isothermal lines, or lines of equal heat, from one point to another, so it might be the time would arrive when we could similarly mark the iso-chemical lines. The result would be bound to prove of immense value to agriculture and horticulture.

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With the Antiquarians.

At a recent meeting of the Lancashire and Cheshire Antiquarian Society, Mr. F. H. Cheetham read an excellent paper on Martin Hall, situated on rising ground fifty feet or so above the level of the flat country to the North, formerly occupied by Martin Mere, and must have commanded in former days a considerable prospect over the shores of the lake.

—o—

Rare Angling Works.

The March meeting of the Manchester Anglers' Association produced an exhibition of very rare works on the art, the call for this purpose being heartily responded to.

REFERENCE LIBRARY, SALFORD, PEEL PARK.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 394, vol. 3).

Hebeloma Fries.

1 { Pileus all yellow or disc darker, wavy, 5-10cm., stem equal fibrillose, apex pruinose... *H. mussivum* Fr.
Pileus not bright yellow... 2

2 { Brick-red, 2-3cm.. naked, *umbo mammiform* *H. magnimma* Fr.
Without prominent mammiform umbo 3

3 { Smell *burnt sugar*. Whitish, disc buff, 3-6cm., *H. sacchariolens* Q.
Smell like radishes or absent; pileus more coloured... 5
Inodorous; pileus white or pallid ochre, 2-5cm. ... 4

4 { Pallid, gibbous; stem brownish, white-mealy. *H. claviceps* Fr.
White; stem whitish, smooth, naked ...*H. ischostylum* Cke.

5 { *Disc papillose*, umber, rest tan, stem wavy. *H. punctatum* Fr.
Disc not punctate with viscid warts 6

6 { Yellowish, disc brown, 1-5cm., stem *reddish* *H. petiginosum* Fr.
Larger, *viscid*, stem pale or white 7

7 { Veil continate, sometimes making the margin silky ... 8
Veil absent from first, pileus glabrous... 16

8 { Pale tan, disc darker; gills adnate, *soon separating and attached to a collar* ... *H. subcollariatum* B. and Br.
Gills not connected by a collar... 9

9 { Brick-red, umbo darker; gills rusty-tan, *margin white serrate*, not spotted; stem floccose... *H. firmum* Fr.
Pale brick-red, gills *crowded*, *lanceolate*, *almost free*. Odour radishy ... ... *H. testaceum* Fr.
Without these characters 10

10 { Smell strong; pale tan, gills subdistant **H. fastibile* Fr.
Smell not strong... 11

11 { Pileus covered with glutinous film, discoid, 4-7cm. ... 12
Pileus viscid, but without glutinous film 13

12 { Soon glabrous; reddish tan; stem silky *H. versipelle* Fr.
Yellowish-white, *white squamulose*, stem *same* *H. glutinosum* Fr.

* Pileus purple-brown = *var. elegans*.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Lejeunea serpyllifolia Dicks. near Manchester.

In company with Mr. Wm. Stanley, I met with this species very sparingly growing with *Metzgeria furcata* L. on rocks by the side of a stream at Mottram, Derbyshire, last October. I think it is worth recording, as the station is within about 10 miles from Manchester, and is not mentioned in Whitehead's Ashton-under-Lyne List. It is recorded from several stations in Derbyshire in Linton's *Flora of Derbyshire*, but all from other parts of the county.

Only a few stems were met with, and being a very delicate species it will probably die out in its struggle with our smoky atmosphere.

W. H. Pearson.

—o—

A Rare Fungus New to Lancashire.

Geaster fimbriatus Fr.

Whilst W. M. Rankin, Esq., M.Sc., of the Storey Institute, Lancaster, was conducting a party of his students—including Mr. Christian, and Mrs. and Miss Walker—from Silverdale to Carnforth over White Moss (known also by the name of Yealand Storrs), fine specimens of this rare fungus were found by several of the party. This is the first record for Lancashire. Its identity has been confirmed by Mr. Harold J. Wheldon, of Liverpool.

In the neighbouring county of Yorkshire it has been discovered in three localities ("Yorkshire Fungus Flora," page 11).

H. Beesley.

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As will be seen from our list of referees, Mr. J. F. Haws, of Liverpool, has kindly consented to answer queries and to give other aid in microscopic work.

REFERENCE LIBRARY SALFORD PEEL PARK

RECENT RESEARCHES INTO THE TRIASSIC ROCKS OF CHESHIRE.

At the last two meetings of the Liverpool Geological Society, important papers were read embodying the results of original investigations on the part of local workers into the Triassic rocks of West Cheshire.

At the March meeting, Mr. F. T. Maidwell described specimens of footprints of Rhynchosauroid forms of the type D^2 Beasley, which he had recently discovered at Runcorn. One of the specimens possesses special interest, inasmuch as up to the present no footprints of the D^2 type, showing undoubted traces of webbing between the digits, have been discovered in strata of Lower Keuper age in this country.

The specimen in question is a natural cast of an impression of a pentadactyle foot, evidently digitigrade, having nearly straight, rod-like digits, widely separated at the proximal ends and terminating at the distal end in sharply pointed claws, with clear evidence of webbing connecting the digits.

Working in another direction, Messrs. C. B. Travis and H. W. Greenwood presented at the April meeting the results of extensive investigations into the mineralogical and chemical constitution of the Triassic strata of the Wirral Peninsula. Hitherto the attention of local workers in the Trias has been chiefly confined to the examination of the larger fragments which form the conglomeratic portions of the Lower Keuper and Middle Bunter sub-divisions, and the finer material, composing the matrix of the sandstones and marls, has not received the same share of attention. In the course of their investigations, Messrs. Travis and Greenwood have examined several hundred specimens from every horizon of the Wirral Trias, extending over a vertical range of 2,300 feet. By the use of heavy density liquids the mineral constituents of the sandstones, shales, and marls were separated according to their respective specific gravities. Nearly thirty species of minerals

have been thus isolated and identified, among which the most noteworthy are tourmaline, rutile, zircon, anatase, brookite, arsenopyrite, in addition to the more commonly occurring minerals. A large number of chemical analyses had also been made in order to determine the composition of the marls and the nature of the cementing material of the rocks, and the presence of calcite and dolomite to a hitherto unsuspected degree as a cement was revealed. Towards the base of the Bunter sub-division the strata were found to be impregnated to a considerable extent with salt, derived from a thin band of very pure salt.

A careful study of the petrographical characteristics of these rocks has led the authors to the conclusion that the material of the Wirral Trias has been furnished by the disintegration of an area composed chiefly of granitoid rocks, although volcanic and metamorphic rocks have also contributed a share, as well as sedimentary rocks of more or less local derivation. Similar investigations in the New Red Sandstone series of south-west England have shown that the material forming those deposits was supplied by the denudation of a pre-Triassic massif of crystalline rocks, of which probably the Armorican peninsula now forms a remnant. The result of the researches of Messrs. Travis and Greenwood, however, show that the rocks of the Cheshire area examined differ in several important mineralogical respects from the formations of the same age in Devon and Somerset, and that they were derived from a different source of origin.

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At Cleveley Mills, on the river Wyre near Scorton, a wren has built a nest in a 6in. ball of twine, used for stringing up bags of bone manure. The hole in the centre of the ball of twine was of exactly the same size as the usual aperture in a wren's nest, and the result was a model of neatness.

LIVERPOOL NATURALISTS' FIELD CLUB.

It was with gloomy forebodings that some of the members met at the Liverpool landing stage on Saturday, April 29th, for the first field meeting of the season, for rain had fallen heavily during the previous night, and had scarcely ceased up to noon on the day of the meeting. The barometer was low, with scarcely any tendency to rise, and the weather prospect was anything but inviting for a ramble among woodland undergrowth. However, "fortune favours the brave," and we started for Ruabon for an exploration of the beautifully situated park of Sir Watkin W. Wynn at Wynnstay. By two o'clock, when we arrived at our destination, the overclouded sky had given place to glorious sunshine, and the banks of primroses in the park were a sight such as can be seen only rarely even in such a fertile spot as this corner of Denbighshire. Our first visit was to the celebrated old oak, "The King," said to be the finest oak in Wales. A grand tree, too, without any indication of hollowness within, and with some of its branches indicating vigorous life. The fine stately bole measures 27 feet in circumference at five feet from the ground, but it runs out below into such buttresses that, standing as close to the trunk as was possible, it took 13 ladies of the party with outstretched arms to encircle the tree. The primroses and anemones proved such an attraction to the ladies that too little time could be given to the exploration of Nant-y-belan (the dingle of the marten), a wild ravine scooped out of the woodlands by the impetuous little river Eithaf on its course to join the Dee. The dingle was carpeted with wild hyacinths, anemones, and wild garlic, with an undergrowth of celandines and moschatel. The dog's mercury grew in luxuriance amid these woodlands, and an excellent opportunity was afforded for contrasting the different appearance of the male and female plants, the light green males and the much darker foliaged females forming quite a strong contrast when growing in patches side by side. The yellow weasel-snout (*Lamium Galcobdolon*) was just breaking its flower-buds, and in another week its handsome flowers will form

charming splashes of golden colour among their azure setting of hyacinths. The rain had played havoc with the wild cherry blossom, and the herbage beneath was whitened with the fallen petals as though by freshly-fallen snowflakes. By the stream the golden saxifrage grew in luxuriant patches, and intermixed with the common species were occasional plants of its much rarer relative, *Chrysosplenium alternifolium*, but not yet sufficiently advanced in flower to be easily detected among the mass of the commoner species. The order prize of the day had been offered for the best collection of mosses in fruit, but there seemed to be very little variety of these plants, only nine species being presented in competition and these of the commonest kinds. The mycologists fared equally badly, though this was to be expected, for spring is, perhaps, the least productive season of the year for fungi. A few *Mycetezoa* and *Uredines* were almost all that were met with, among the latter being the cluster-cups of *Puccinia caricis* on the nettle and of *Uromyces poæ* on the leaves of celandine, and teleutospores of *Uromyces ficariæ* on celandine and of *Puccinia adoxæ* on the moschatel. The botanical enigma of the day was solved and found by eight members of the party, the plant being—but stay, would not some readers of the *L.N.* like to solve the enigma for themselves? Here it is :—"A tender herbaceous plant with slender stems and roundish shortly stalked leaves that spring from the stem in pairs. The flowers are perigynous, and have a petaloid calyx deeply cleft into 4 lobes, no corolla, 8 (rarely 10) stamens which arise from the calyx, and a bicarpellary gynœcium with two long styles. The genus to which this plant belongs derives its botanical and English names from the colour of the flowers." The solution shall appear next month. After tea at Ruabon the party returned to Liverpool well pleased with the first meeting of the season.

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The June arrangements of the Warrington Field Club are as follow :—10th, Hatchmere ; 24th, Grange-over-Sands (for Witherslack), week-end excursion.

LIVERPOOL BOTANICAL SOCIETY.

The monthly meeting was held in the Hartley Botanical Laboratory on Monday, April 10th, the Vice-President, Dr. Ellis, F.E.S., in the chair. Numerous communications and exhibits occupied the attention of the members. The Chairman exhibited a charmingly executed series of drawings of new Wirral Fungi, both micro. and macroscopic. Mr. J. A. Wheldon showed flowering examples of *Helleborus viridis*, cultivated at Walton from plants originally found on limestone soil in Gatebarrow Wood, West Lancashire. The soil in which they had been cultivated contained less than 1% of lime, yet, allowing for the exposed situation of the garden, they showed little diminution in stature and healthy luxuriance after several years of observation. Mr. W. G. Travis made some remarks on *Stellaria Dilleneana* Mœnch, a new British plant, and exhibited examples collected by Mr. Druce in Middlesex. It is allied to *Stellaria glauca*. Mr. H. J. Wheldon showed *Geaster fimbriata*, a fungus new to Lancashire, found by Mr. Rankin on Yealand Moss. Mr. A. A. Dallman gave a short biographical history of Mr. George Caley, an old Lancashire botanist, and read an autograph letter of his, of which photographs were distributed. He was the discoverer of *Discelium nudum* near Manchester. The chief item on the programme was Mr. W. R. Sibbald's lecture on "The fixed oils and their role in plant economy." He described the various fats and oils which occur in plants, and traced their occurrence in different orders. Their chemical structure and properties were fully discussed, and their significance in the economy of the plants pointed out. His remarks were illustrated by lantern slides, diagrams, and numerous specimens of oil or fat bearing seeds, etc., and their commercial products.

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At the meeting on May 7th Dr. Ellis again took the chair. He exhibited some interesting dried flowering plants and colour sketches of *Æcidium leucospermum* D.C. (the only British white æcidium on anemone leaves), and the æcidiospore stage of

Puccinia caricis (Schum.) on nettle. Mr. Dallman received for distribution interesting flowering plants from corresponding members, and he made observations on some of the finds at the Nant-y-ffrith excursion.

Professor Harvey-Gibson left for exhibition an *Arum* which was making splendid growth, although the roots had been removed and moisture was kept from the bulb.

Mr. H. J. Wheldon exhibited a sketch head of sheep on the horns of which *Onygena equina* (the hoof fungus) was growing. He also showed colour sketches of new local Pyrenomycetes. Both papers, "The Unity of Life," by Mr. Bayliss, and "Welsh Plant Folk Lore," by Mr. Dallman, were appreciated, the latter containing much amusing but interesting matter.

Dr. Ellis, Dr. Lee, and Mr. Delaney made interesting comments on the papers.

The first field meeting was held at Nant-y-ffrith and Llanfynydd on May 6th. The weather was fine, and there was a good attendance, 42 taking part. The district is one possessing great interest for the botanist, and special permission had been obtained from Mr. R. H. Venables Kyrke to visit the private walks, caves, and waterfalls at the upper end of Nant-y-ffrith. Many of the interesting plants which favour the district were noted, among these *Chrysosplenium alternifolium*, *Helleborus fœtidus*, *Myrrhis odorata*, and *Prunus Padus*.

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The Society is promoting a series of prizes and certificates for botany and nature study, to be given to boys and girls residing in Lancashire and Cheshire. These will be divided into two sections—for secondary and private schools ; for public elementary schools. The prizes are to be offered for essays on various branches of work; photographs, drawings, and paintings; and for nature diaries. If the scheme is carried forward, it is hoped to have an exhibition of the work in December.

SOCIAL GROUPS AND ADAPTIVE CHARACTERS IN THE BRYOPHYTA.

By J. A. Wheldon, F.L.S.

(Continued from page 8.)

The asexual reproductive apparatus frequently consists of strongly differentiated *multicellular* bodies, of very varied shapes, arising from almost all parts of the gametophore. In a few species they are collected in special receptacles. In *Marchantia* these latter are cup-shaped, in *Lunularia* crescent-shaped, and in both cases according to Campbell,[12] they are modified air-cells of the thallus. In these cells the original pore-like openings have become widely patent, allowing the gemmæ to ripen and escape. In *Tetraphis pellucida* they are borne on attenuated branches, the cup consisting of foliaceous bracts, and the gemmæ are mixed with paraphyses. Their position, the shape of the bracts and paraphyses, and the fact that they often arise in pairs like the male flowers, indicate that these gemmæ are probably modified antheridia. Dr. Braithwaite states that gemmiform shoots sometimes also arise from the female inflorescence.[13] In *Aulacomnium* there is no involucre, but the gemmæ are collected in globose heads at the summit of pseudopodia arising from the branches. Multicellular gemmæ of various shapes are produced from the surface, margins, and apices of leaves in several species of *Orthotrichum*, *Zygodon*, *Leptodontium*, and *Grimmia Hartmanni*. In the *Bryaceæ* and *Tortulaceæ* they are frequently axillary, as in *Barbula rigidula*, *B. gracilis*, *Bryum atropurpureum*, *B. Dixoni*, *B. gemmiparum*, *Wabera annotina*, *W. proligera*, and *W. commutata*. They occur in a similar position in some pleurocarpous mosses, *e.g.*, *Pterygynandrum filiforme* ; and in *Plagiothecium latebricola* they may be found springing from both the axils and the tips of the leaves. In *Tortula papillosa*, *Calyptopogon mnioides*, etc., they originate from the upper face of the nerve of the upper leaves.

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Even this does not exhaust these aberrant methods of reproduction. The rhizoids produce gemmæ in some species of *Dicranella*, *Bryum*, and *Zygodon*; and in *Octodiceras* new plants are said to arise from the margin of the calyptra! Coppey mentions the regeneration of *Cephalozia bicuspidata* from fallen perianths. Some mosses creep extensively by means of subterranean rhizomatous shoots; and in the hepaticæ perennating tubers are formed (in which food is stored), which persist after the rest of the plant has died down.

All these accessory means of multiplication have arisen to meet various exigencies of the sexual apparatus. Many of the species which produce them are dioicous, and the sexes frequently do not occur together, so that spores are rarely, if ever, produced. In other monoicous species, the sexual apparatus is very prone to suffer damage owing to the delicacy of its parts. Some of the gemmiparous species are alpine plants growing in exposed places, subject to severe frosts or devastating winds, which have a markedly deleterious effect on the delicate sexual organs. Even when the sporogone is developed, it is subject to the attacks of insects and fungi. It is not surprising, therefore, with such varied alternative means of continuing existence that many mosses appear to be entirely losing the habit of spore producing.

C. **The Gametophore** is, as a rule, the most conspicuous and familiar stage of the moss plant. In it the vegetative process is most highly developed, and as on it depends the question of supplies, for both itself and the sporophyte, it shows many interesting modifications, and is most liable to variation. The plants are of necessity small in stature on account of the absence of a regular vascular system. Special conducting cells of a simple character occur in the stems of a few species, and the nerve frequently found in the leaves is regarded as a conducting tissue. The most highly developed stem structure is found in *Polytrichum*, and it is the tallest of our non-aquatic species. But the longest stems occur in those which grow

submerged. For instance, in deep water near Southport *Hypnum pseudofluitans* and *H. lycopodioides* occasionally attain a length of over two feet, and Wilson mentions the occurrence of a Sphagnum near Edinburgh which reached the unusual length of seven feet.

When the Bryophyta grow in drier situations than usual, there occurs a marked shortening of the interspaces between the leaves and branches. This gives the plant a totally different aspect, as may be seen in the case of the ordinary form of *Sphagnum papillosum* and its *variety confertum*. As an example of the converse effect may be instanced *Lophozia inflata*, which, when immersed in pools becomes *variety laxa*, and in very deep bogs develops into the elongate distant leaved *var. natans* Schiffn. This ready responsiveness to local conditions has led to the creation of many varieties which are scarcely deserving of separation. Many of them are united by almost imperceptible gradations, and a truer conception of their real status would be afforded by their relegation to the grade of "forms." It is, however, less easy with mosses to test these points by cultivation than it is in the case of flowering plants. As instances of responses to edaphic conditions, two forms of *Hypnum aduncum* may be cited. One example (*var. laxifolium* Schimp. = *forma laxifolia* Ren.) grew in a pond near Walton, completely submerged. In this specimen a portion of the middle of the stem, half an inch long, bore 23 leaves. Another form of the same species occurring in drier places (the particular stem examined was creeping over damp bricks by a pond side), referred by Mons. Renauld to *var. polycarpon* Bland, yielded 40 leaves to the half inch. The stems of *Hypnum pseudofluitans* are under average circumstances from 15cm. to 25cm. in length, but when grown in deep water under favourable conditions of temperature, specimens were found at Birkdale 90cm. in length. As a contrast I have seen examples of the same plant, which were found growing quite luxuriantly in the vicinity on a dried up marsh, bearing abundant leaves and branches, but with stems

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A RAMBLE BY A FORMBY DITCH.

By E. Reid.

Formby, to the botanist, calls up to the mind charming vistas of nice clean sandhills where such treasures are to be found as the exquisite grass of Parnassus, the waxy pyrola, the curious American Claytonia, and the hound's tongue, with its tantalisingly affectionate burs, but I wish to take you for a short ramble by a Formby ditch, for the ditches are an equally distinctive feature of the landscape. There *are* people, I am afraid, to whom, like the notorious Peter Bell,

> "The ditches by the roadside's brim,
> But dirty ditches are to them,
> And they are nothing more."

But if such deluded folks were to take a short stroll by the one that I have in my mind's eye it would not be long before they would be rambling through the English language to find a few more choice words to describe them, and they will be talking of "delightful ditches," "enchanting ditches." "fascinating ditches," "irresistible ditches." Indeed, if there are books in the running brooks, there are whole picture galleries of beauty and interest in the Formby ditches.

> "Ah me! what lovely tints are there
> Of olive green, and scarlet bright,
> In spikes, in branches, and in stars,
> Green, red, and pearly white."

At no time of the year are ditches quite devoid of interest, as there is always pondweed of some variety to be noticed below the water, and indeed quite early in the spring, the leaves of the water plants which have been lying in mud at the bottom of the water, begin to travel upwards.

(To be continued.)

THE BIRDS OF OLDHAM.

By Fredk. J. Stubbs.

(Continued from page 28).

Woodcock. *Scolopax rusticula* L.—I have often met with the bird both in woods and in marshy fields. The majority of local specimens are shot in November, and at this season they are not infrequently "telegraphed." I have seen one that was picked up dead by Mr. J. Harrop, who actually saw it dash into the gable end of a house in Ripponden Road.

In April, 1907, Mr. A. Rodgers flushed one from some dense bushes in Bardsley Clough, and had the forethought to pick up a couple of feathers to assist me in naming the bird from his good description of its general appearance. This was interesting to me because I had noticed the bird late in the spring in a neighbouring locality far more likely to hold a nesting Woodcock than Bardsley Clough; and on April 10th, 1909, my wife and I came across a bird in a local wood that seems in every way suitable for the nidification of this early breeder.

Great Snipe. *Gallinago major* (Gm.).—Brown Snipe. Solitary Snipe. One was shot at Bagley Fold by Abraham Nicholson in 1880, as Mr. Percival has described to me. A second authentic specimen is the Chadderton record in the "Bury Report." Stott lists it as a "Resident" at Hollingworth!

Common Snipe. *Gallinago gallinago* (L.). — Lady Snipe; Full Snipe; Big Snipe. Decidedly increasing as a breeding species, but I cannot see how it will maintain this status for many more years between Ashton and Oldham, a district where I have seen many nests. The continual drumming and chirping, and the ringing yells as the bird bobs vigorously on the ground (the last-named almost mimicing

the noise of a steam chaff-cutter) may be heard throughout the night. My earliest date for the drumming near Oldham is March 10th, and my latest June 27th. On December 20th, 1908, I flushed fourteen from a small marshy corner at Bardsley, and actually had ten in sight in the air at the same time. I have accumulated such an unwieldy mass of notes on the habits, anatomy, development, evolution, etc., of the British Snipes that I must not attempt to touch the subject now, but hope to do so later.

Jack Snipe. *Limnocryptes gallinula* (L.).—Very common, but known only to gunners. Sometimes I have had birds brought to me in the second week in September, and have shot them myself in the third. The main body leaves at the end of March, although odd ones may be flushed in April.

Stone Curlew. *Œdicnemus œdicnemus* (L.).—Watts lists it for Piethorne, without details; and ten years ago, in a Manchester evening paper, Mr. E. K. Robinson accepted and published records relating to Longdendale. In this case I ascertained that the observer had been misled by being unaware that in the spring the Common Curlew indulges a fondness for walking along the tops of the stone walls. I have often watched them thus engaged, and except when viewed from a little distance, their thin bills are invisible, and, moreover, their cries are unorthodox.

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At the annual Conversazione of the Liverpool Microscopical Society, held on May 5th, members of visiting societies exhibited the following :—*Bacillus rossii* (stick insects), Joseph A. Cubb; Water-colour sketches of British micro-fungi and lichens, Harold J. Wheldon; interesting mosses and lichens, J. A. Wheldon; Indian Hemiptera, Oscar Whittaker; four plant studies from life on the sandhills, 6 drawings illustrating the growth of the elm, and sketches of the sandhills and of cliff and boulder on Donegal and Yorkshire coasts, T. A. D. Wills.

ZOOPHYTES:
THEIR LIFE HISTORY.

By Joseph Smith, M.R.I.A.,
Fellow of the Royal Society of Antiquaries, Ireland.

(Continued from page 12.)

The species *Pagarus striatus* generally has attached to the shell it has selected as its habitation, one or more of the anemones, *Adamsia rondeletti*, and the advantages the crab, which possesses an unprotected body, derives are, that it enjoys additional immunity from dangerous enemies, beyond the protection afforded by the shell, in the formidable organs of defence anemones are furnished with — stinging cells. In return for this service the anemone is transferred to fresh feeding grounds, and since it is exceedingly voracious, it is delighted to be carried about in search of its prey. A feature of this partnership occurs in the *Hydra viridis*, green hydra; the cells of the endoderm are prominent from the presence of green granules, or colouring matter. This strange feature imparts the characteristic colour and gives the animal its specific name. The colour imparted will be noticed to be not the green which increases the brilliancy of birds, but it is that of grass and trees. Animal chlorophyll is the term which has been suggested to explain away the phenomenon, but this is incorrect. The colouring is due to the symbiosis of small algæ in the form of round green corpuscles. They were considered to be equivalent to the chlorophyll corpuscles of the vegetable world, but it is now ascertained they are surrounded by a body wall. Beyerinck devoted much attention to the question, and after many difficulties, was successful in cultivating them independently, thus proving them to be small green algæ living within the body of the Hydra, and which he named Zoochlorella.

The advantages derived from the presence of these algæ are the ability they possess of forming starch and sugar from the carbonic acid gas contained in the water, and which is capable of being transfused through the cell wall of the animal into the tissues. In some of the Tubularians, according to

Haastein, the Zoochlorella have undergone degeneration, and having lost their cell wall they are entirely dependent on the animal and cannot be cultivated independently. One of the chief difficulties besetting the study of the Hydroida was the method of propagation, since it presented some complicated, and in the infancy of investigation, almost incomprehensible problems. These difficulties not only affected the lower organisms, but also applied to the more differentiated forms of the vertebrate kingdom. The difficulty in the first instance arose from ignorance of the fact that the cells could not arise without the aid of pre-existing cells, consequently theories had to be elaborated to explain the beautiful phenomenon of the propagation of cells necessary for the purpose. Not until 1845 was cell development by segregation known, and very shortly afterwards Van Baer demonstrated the mammalian ovum to be a nucleated egg. This theory once proved, was applied to all branches of the animal kingdom. It removed all pre-existing difficulties, and opened out what had previously been overlooked, that life, even of the lowest forms, was propagated from this egg cell. One of the most curious features of this discovery is, that many years previously Harvey enunciated the same theory when he wrote "*omme vivum ex ovo*," but he was unable to demonstrate the evolution of this ovum.

Reproduction takes place in the Hydroids in two ways, sexually and asexually : the first by fertilisation of the ova ; the second by budding and fission.

The Hydra is the simplest form of Hydroids ; it belongs to the sub-order Eleutheroblastea, signifying free buds, and is descriptive of the nutritive buds, which, in place of being permanently attached, become free and enjoy an independent existence. The Hydridæ is the only family, which is fresh water belonging to this group, and it is probably the one solitary exception to the method of reproducing the species by special buds or gonophores. It is, however, no exception to that law which regulates the sexual products ; this progression being carried on by distinct processes which are the sporosacs.

At the season of the year when propagation suggests itself, a wart-like substance forms in the lower part of the body ; this is the egg or ovum, while nearer the mouth one or two more excrescences ripen in the body wall of the parent, and fertilisation having resulted by the bursting of, or rather the discharge of the spermatozoa from the capsule, the upper excrescences disappear. The lower wart-like substance develops, and the fertilised ova, being eventually discharged from the parent, continue in a similar manner the cycle of evolution they have themselves passed through.

In the tissues of the tentacles, a series of stinging threads, or as they are termed, nematocysts, are found, which play a great part in the economy of the organisms. They are long thick wall sacs, each secreting in the interior a long thin thread coiled up, and which when drawn out or exerted are remarked to be hollow.

The motion of these stinging organs is a rapid one, somewhat similar to that caused by the forcing of the air against the cork of a toy popgun. They are, besides being hollow, not infrequently serrated, and being endowed with an urticating activity, they are considered to be organs of defence. They are of utility in the struggle for existence, for in addition to being organs of defence, they play an active part in the procuration of food, and also help in the process of digesting it.

If one of the generating cells of a thread cell detached from the ectoderm is examined, it will be noticed it contains a protoplasm of a pale yellow colour, in which a small isolated cell has evolved, occupying the interior of the vacuole, where it has the appearance of a nucleus in a cell. Continuing its evolution, the separated mass becomes larger, assumes a more oval shape ; two corpuscles are now apparent, and eventually a stinging thread replaces the pale yellow protoplasmic mass of the generating vacuole. On attaining maturity we have the opportunity of examining the thread cell previous to the discharge of its contents. There is the double wall of the capsule ; the reflexed portion of the inner membrane of the

capsule wall forming the axial tube of the undischarged thread cell, and the filament lying in a complicated coil at the base. We have now the first stage in the active evolution of the thread sac, in the double wall, and the barbed sac formed by the eversion of the axial tube, the filament still remaining in the capsule. The projection of the barbed sac does not, however, complete the phenomenon of expulsion, for in most cases the first act is instantaneously followed by another, which consists in the projection from the pointed apex of the sac of a long filament of great tenacity and transparency, and which is thirty or forty times the length of the longer diameter of the original capsule.

These nematocysts, moreover, are valuable as a distinguishing feature between the members of the Hydrozoa and the group Anthrozoa, in the barbed heads with which the majority of them are surmounted. It is a characteristic which may be regarded with great certainty; the Hydroids are usually furnished with either an unbarbed thread or one in which the barbs are limited to three, whilst nematocysts of a more complicated structure are almost entirely representative of the Arthrozoa. Hydroids are divided into five sub-orders :—

The ELEUTHEROBLASTIA, signifying free buds, of which the Hydridæ, the freshwater group, are the sole representatives.

The GYMNOBLASTEA, naked budded, where there exists no external protection or receptacle—hydrotheca or gorangium—investing the nutritive or generating buds, and of which group the Tubularians are examples.

The CALYPTOBLASTEA, or covered bud, which possess an external protective receptacle — hydrotheca or gorangium—investing either the nutritive or generative buds.

The MONOPSEA, single appearance, and RHABDOPHORA, rod bearers. This sub-order corresponds with that extinct group of Graptolites, in which a solid rod is developed in the walls of the chitinous perisarc.

Now in all Hydroids belonging to the Calyptoblastea and Gymnoblastea sub-orders, there exist two groups of zooids named respectively those of the throphosome, and those of the gonosome, the former having as their proper function the general nutrition of the colony; while those of the other group, the gonosome, have nothing to do with the nutrition of the colony, and are purely generative zooids. Their proper function is true generation, and they give rise to the generative elements, ova or spermatozoa.

With the solitary exception of the Hydridæ, every Hydroid we are acquainted with is essentially constituted of a throphosome for the preservation of the individual, and a gonosome for the perpetuation of the species.

The throphosome is composed of the hydranths, the species of which are in Calyptoblastic group, surrounded by the cup—the hydrotheca or gorangium—and are supported on a hydrophylon. The tentacles may vary both in their form and number. That portion of the hydrophylon which combines the colony into one community is termed the hydroculus, and the part by which the colony is rooted to the rock, shell, or seaweed is known as the hydroriza.

The sexual propagation of the species is carried on by means of sperm cells, *i.e.*, spermatozoa, and ova, and the latter, when the period of maturition arises, have an attractive affinity for the contact of the sperm cell or spermatozoon. When the function of contact has been consummated, we have that wonderful series of phenomena ensuing, which finally gives rise to the embryo, medusa, or planula.

True sexual reproduction is two-fold, viz., by means of a planula, and also by a medusa, and it has been ascertained that every species of Hydroids gives rise to zooids male and female, or in case of such medusæ as may be directly developed from the egg, to male and female sexually generated individuals, the one destined for the production of ova, the other for the generation of the spermatozoa. The separation of the sexes in distinct generative zooids, or in distinct individuals of asexually

generated offspring, is thus absolute amongst the Hydroids. In by far the greater number of instances, the separation is carried still further than this point, for we scarcely ever meet with male and female gonophores on the same colony. As an almost universal rule, then, the Hydroids are diœcious, in other words every colony is unisexual.

In some few instances cases of a monœcious condition occur, for example, in the freshwater Hydra. Allman has also noticed this condition in *Plumularia pinnata*, which sometimes carries on the same stem male and female gonophores, and Hincks has also recorded examples of this condition existing amongst the Sertularian hydroids.

In *Dicoryne conferta* there may be found amongst the great forest of stems which invests the shell, some stems which may carry male and female gonophores, but when this occurs the male gonophores are carried on a separate stem, while the female gonophores are similarly distinct.

The sporosacs are carried on true blastostyles; their construction is like a sac, or outer skin, within which a second sac is contained; within this second sac are the ova or spermatozoa, as the case may be, and a long spadix occupies its axis. On liberating themselves when they have attained maturity they immediately throw back the two tentacles, which diverge from the proximal extremity, and which now develop to about twice their original length. This true sporosac is covered with cilia which extend even to the end of the tentacles, and with the aid of these it swims actively in the surrounding waters. This curious planoblast is one of three forms of locomotive zooids which occur among Hydroids. These forms are :—

(1st) Natatory or swimming medusa, which occurs in Syncoryne, Cladomena, and Carymorpha ;

(2nd) The ambulatory or walking medusa, which is found in the Clavatella ; and

(3rd) The natatory sporosac which is characteristic of the Dicoryne.

This form is by Hincks considered to be intermediate between the fixed gonozoid and the medusa, the tentacles representing the usual swimming organs, and their ciliary motion replacing the pulsation of the swimming bell.

It is difficult to say whether the generating zooids, which mature between the walls of the ectoderm and the endoderm, originate in the tissues of the latter, or in those of the ectoderm, since in the majority of instances they can be seen occupying the space between these membranes, and which, as the ova or spermatozoa increase, become separated by greater space. Allman considers, from several observations he has made, that the generative elements, whether ova or spermatazoa, originate in the tissues of the endoderm, the ectoderm merely forming a protective covering until such time as they mature, and acquire liberty by the rupture or absorption of the endodermic sac. In *Coryne pulsilla* the formation of the ova may be satisfactorily traced, and after undergoing the various phases of cell development, they become metamorphosed into fully formed ova. The gonophores may be borne on a distinct peduncle, as in *Syncoryne examia*, or on branches as in *Corymorpha natans*, each branch bearing a gonophore at its apex ; or the peduncle may be obsolete and the gonophore become sessile, as in *Laomedia flexuosa*. In other instances the blastostyle, with the gonophores which bud from it, may be surrounded by a chitinous covering or investment called a gorangium.

In the gorangia of the *Laomedia flexuosa*, the development of the ova can be traced, increasing as they move up from their lower position ; while in *Obelia geniculata* the medusiform development can be made out with ease, increasing as they pass from the lower part of the blastostyle until they are mature, and eventually acquire a separate existence.

While the general rule amongst the Hydroids is to discharge the generative elements into the surrounding water, there exist exceptions amongst some of the Calyptoblastic females, *e.g.*, in the Sertularians and in Calycella, and in place of the elements being discharged into the water, they are retained in a peculiar

receptacle, wherein they undergo further development. This receptacle is supported on the apex of the gorangium, and lies external to its cavity. It is termed the acroycist, and apparently, so far as our knowledge extends, is entirely confined to the female.

The most interesting modification of the gonosome is that found in the *Gonothyrxa loveni*, and this feature offers a very interesting branch of study for those pursuing the variety of phases in the life history of polyps.

Sometimes the blastostyle, when in a very young stage, breaks up into several distinct tubes, which again unite in the plug-like cavity of the apex. Agassiz has shown this to be the case with his *Laomedia (Clytia) posterium*, and Allman has also found it in a species from the east coast of Scotland. This is analagous to the breaking up of the cœnosarc in the genus *Antennularia antennina*, in which the whole cœnosarc is broken up into separate tubes, each with its own ectoderm and endoderm and surrounded with a perisarc or outer covering.

We have now taken a passing glance at a few of the histological features of the Hydroida, we have reviewed the development of the spermatozoa, and the segmentation of the ovum ; we now come to the planula stage, the embryo of the future colony. In *Clava squammata* the colony can usually be found in various phases, some fully extended, others in the various stages of contraction, and carrying gonophores, while *Cordolophora lacustris* presents us with a very interesting form, and is an example of the survival of the fittest, or perhaps better, an example of adaptation to environment. This form is found inhabiting both fresh water and brackish water, and therefore offers good sport for speculation as to whether any of its structural features have been modified, to enable it to earn its livelihood in the altered surroundings into which chance may throw it.

Eudendrium ramosum is another Hydroid in which the embryo is a planula.

CURIOUS LANCASHIRE FUNGI.

—o—

By Harold J. Wheldon.

Whilst preparing an account of the fungi for the Flora of South Lancashire which is shortly to be published by the Liverpool Botanical Society, the writer has met with many rare and interesting species. Some are interesting for their rarity, some on account of their beautiful colour, and others for their peculiar shapes, growth, and habitat, and the following notes on some of the curious forms which have been observed in the county may be of interest, notwithstanding that several of the types described are not uncommon.

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A Deformed Toadstool.

A fungus which is often abnormal in shape is *Lentinus lepideus* Fr., a white-spored toadstool of a tough and pliant nature, especially when dry, the stem being almost woody. This agaric was found by Mr. J. A. Wheldon, F.L.S., growing between railway sleepers at Pilling during May, 1910. The pileus was 5-6 inches across, but was very much deformed and flattened laterally, having grown in a space less than an inch in width between the sleepers. The umber scales which usually adorn the pileus were undeveloped in the compressed portions. This agaric has an unpleasant smell, and is sometimes phosphorescent. Dr. M. C. Cooke has figured a form of this species which had assumed the shape of a large Clavaria.

—o—

Anomalous Growth of Pleurotus.

In March this year some well-grown specimens of the pretty blue form of *Pleurotus ostreatus*, a stemless agaric known as the Oyster Mushroom on account of its edible qualities, appeared on some old poplars at Aintree. These were photographed *in situ*, and a large specimen was collected and placed under glass, for sketching purposes.

Unfortunately this specimen was forgotten, and on examining it a few days later, nearly the whole of the fungus was covered with what appeared to be a downy white mould. The Pleurotus was left undisturbed and kept under observation. In about three days after the "mould" was noticed, numerous small white papilliform prominences formed, which in a few more days proved to be pilei of an agaric.

There were several hundreds of these diminutive white "heads" formed on all parts of the Pleurotus, including the gills.

Within a fortnight nearly fifty of these increased in size to about half an inch, and soon assumed a slate-colour, whilst the gills were distinctly anastomosing behind. In other words, numerous small examples of *Pleurotus ostreatus* were growing in clusters from all parts of the old specimen of the same species. Only a few of these small specimens were laterally attached to the stem, the majority being quite central—an unusual form in the genus *Pleurotus*.

Of the large number of remaining papillate heads scarcely any developed to more than an eighth of an inch in diameter or assumed the appearance of an agaric.

All the new growths faded as the source of nourishment became exhausted, whilst from the first appearance of the young fungi, cold frosts prevented rapid or successful development.

Photographs were taken on various occasions during the period of growth.

Whether these unusual growths resulted from the germination of the spores of the large Pleurotus I cannot say, although I noticed that the surface of the pileus was dusted with the spores of the specimen growing above (the pilei being arranged in an imbricate manner), and these may possibly have germinated on the decaying pileus.

A Parasitic Agaric

is an unusual occurrence, but there is a small genus called *Nyctalis* the species of which always grow on other agarics, chiefly of the genus Russula, and an example was collected on *Russula fœtens*, near Leck, West Lancashire, by my brother, Mr. W. A. Wheldon, in September, 1910. This plant presents a curious appearance, growing as it does from all parts of its host, and the pilei being profusely covered with white conidia contrast well with the darker surroundings, for the plants almost invariably occur in shady places.

As in the only other British species, *N. asterophora*, which is distinguished by the stellate conidia on the pileus, the parasite is gregarious or fasciculate, each pileus being about half to one inch in diameter.

—o—

Earth-Stars and Stalked Puff-balls

appear in our fungus flora, and one of these, *Geaster fimbriatus*, was recorded in the April number of this journal. The genus Geaster differs from the allied genus Lycoperdon in the outer layer of the peridium splitting from the apex in a stellate manner, so that the fungus appears to be seated on a star with five to fifteen segments. Another curious puff-ball, *Tulostoma mammosa* Fr., was brought to me by Mr. W. G. Travis from the sandhills at Ainsdale in 1909, and I have since collected it at Freshfield and Formby in a similar situation. Marratt records it from Southport in Higgins' "Opuscula," which is dated 1879. This puff-ball is borne on a stem about 2 inches long and is the only British species. It first appears sessile, but the stem is rapidly elongated, rupturing the outer veil or cortex, part of which remains as an appendiculate collar on the peridium or "head," and part adheres as a small volva-like structure at the base of the stem. Two forms occur, one brown with a stoutish stem, and another yellowish-white with a slender stem. It has been recorded as growing on an old wall among moss at Castle Howard. (*Yorkshire Fungus Flora*, p. 10). The globose peridium or "head" contains the

spores, which puff out when the peridium is squeezed, in a similar manner to the ordinary puff-ball.

—o—

Bird's Nest Fungi

are always objects of interest. They are cup-shaped, and inside lie several spore-containing bodies called peridiola, veritably looking like minute nests containing eggs. There are four genera represented in the Lancashire fungus flora so far. *Cyathus vernicosus* DC, which Mr. H. Murray records from Flixton, and the common *Crucibulum vulgare* Tul., which I have found at Formby, Kirkby, and Latham, and with Mr. J. W. Hartley at Carnforth. These have the mouth of the "nest" first covered by a white membrane, and the peridiola are attached inside by a funiculus or cord. *C. vernicosus* occurs on the ground in stubble fields, flower boxes, etc., and *C. vulgare* on rotten twigs, chips, etc., and both are only about ¼ inch across.

Another type is *Nidularia pisiformis* Tul., which is pea-shaped, the peridiola being enveloped in mucus but not attached by a funiculus. Mr. H. Murray has communicated this from Flixton.

The fourth kind, *Sphærobolus stellatus*, is perhaps the most interesting. It is a globose structure, consisting of two layers, at first immersed in a mass of white mycelium. This fungus ruptures in a stellate manner above, and the inner layer, enclosing the peridiolum, elastically extrudes, and the single sphærical yellowish peridiolum containing basidia and spores is ejected for seven or eight inches with a slight clicking sound. This fungus, which is only about one-tenth of an inch in diameter, occurs gregariously on rotten wood, twigs, etc , and is common. It is recorded in Higgins' "Opuscula" for Rainhill, Huyton, etc., and Mr. Murray has recorded it from several localities near Manchester on leaves and twigs.

Stinkhorns (Phalloideæ)

are probably the most curious fungi occurring in Lancashire. There are but two British species, each representing a single genus, viz., *Ithyphallus impudicus* Fisch. and *Mutinus caninus* Fr. Each commences as a white egg-like body containing the pileus and stem surrounded by a mucilaginous substance which makes the young plant soft and elastic to touch. In this condition no smell is present, and I understand that in the case of *I. impudicus* they are called "ghosts' eggs" in Kent. After a certain time these "eggs" rupture on top, and the spongy stem rapidly elongates to the height of about five or six inches, bearing at the apex a helmet-like pileus which is covered with a greenish slime which contains the spores. As soon as this is complete the fungus has an abominable and disgusting smell, by which it can be detected at a distance of several yards. Large numbers of flies are attracted to eat the slime, which is soon completely devoured by the greedy insects. The spores pass unharmed through their bodies and are thus disseminated. *M. caninus* is similar but much smaller, mostly odourless, and the cap is adnate to the stem. Only smaller flies visit it, and when the mucus is eaten the bright red apex is visible. Both are recorded from many localities in Lancashire.

—o—

The Hoof Fungus (*Onygena equina* Pers.)

Was dealt with in full by Mr. R. Standen in these pages (April, 1910, Vol. III., p. 14), so further description would be superfluous, but I am glad to record it for Lancashire, Mr. Standen's specimen having been found in Derbyshire. Whilst botanising at Easter on Tarnbrook Fell, Over Wyresdale, with Miss M. Dunning and my father, we found a heap of sheep remains, and the chitinous substance of the horns was covered with the white heads of the Onygena. When portions of the granulose, brittle outer covering of these "heads" is removed, the ochreous mass of spores is observed. I recently found a similar *Onygena* on the remains of a bird in a swamp near Aintree. This is probably *O. corvina* Alb. et Schwein.

Cordyceps militaris (L.)

is no doubt a familiar fungus, attacking larvæ and pupæ of butterflies and moths. The insect is first attacked by a kind of mould, *Isaria farinosa*, which is the conidial condition of *Cordyceps militaris*. The entire insect is converted into a mass of mycelium from which the red, clavate, head bearing asci and spores is developed. I have many records for this parasite.

—o—

"Witches' Brooms"

are the familiar dense tufts of branches on the silver birch, and are caused by the ascigerous fungus, *Exoascus turgidus* Sadeb. (*Ascomyces* Phil.). I have observed these "brooms" on birch at Simmonswood Moss, near Kirkby, and at Dolphinholme, West Lancashire.

—o—

LIVERPOOL MICROSCOPICAL SOCIETY.

The annual Conversazione was held on Friday, May 5th, at the Royal Institution, Colquitt Street. The exhibits included living organisms by C. F. Burne, H. E. Davies, A. H. Dearsley, E. Leonard, F. N. Pierce, and F. W. Hutton; moss leaves and fern prothalli, A. H. Dudley; canal life, W. Grisewood; protoplasmic circulation in *Elodea canadense*; pond life, J. D. Macphail and W. H. Read; Cyclops, F. W. Strumpel; Diptera, daddy longlegs, Jos. Wall; blood films from cases of plumbism (lead poisoning), showing basophile granules in red corpuscles, Miss M. E. Young; circulation of protoplasm in Nitella, F. J. Smith; Polyzoa, J. T. Norman-Thomas.

—o—

A case is reported from the Wyresdale district of a water hen's nest built in a holly bush 10 feet above the ground.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 31.)

14 { 7-14cm., wavy, yellowish, brick-red; stem *white*, fibrillosely striate, gills broad ... *H. sinuosum* Fr.
Stem whitish above, base brownish 15

15 { 4-9cm., ochre to rusty-yellow, edge crisped; stem *scaly* below; spores 10 x 6 ... *H. senescens* Fr.
3-4cm., gilvous, disc bay; spores 8 x 5 *H. mesophæum* Fr.

16 { Smell *strong like radishes*. Gills not spotted, broad... 17
Smell *strong* but *not like radishes*, unpleasant... ... 18
Smell *weak* or absent 19

17 { Pale tan, wavy, 7-12cm.; stem stout, striate. *H. sinapizans* Fr.
Pinkish-ochre, margin whitish, 6-10cm., stem twisted *gills adnexed with a decurrent tooth* *H. elatum* Fr.
Gilvous, stem wavy, long; smell *soapy*. *H. subsaponaceum* K.

18 { Brown then yellowish, 4-7cm., gills crenulate *H. lugens* Fr.
Whitish-ochre, gibbous, 3-4cm., gills broad *H. nauseosum* Cke

19 { Gills *spotted*, stem *flocculose*, white *H. crustuliniforme* Fr.
Gills *not spotted* when dry 20

20 { Somewhat rufous, edge paler, wavy; stem *not truly fibrillose nor scaly, short, robust* ... *H. truncatum* Fr.
Stem fibrillose, longer 21

21 { Tan then whitish, 3-6cm.; *stem long*, 8-11cm. *H. longicaudum* Fr.
Pileus 4-7cm., stem shorter, 3-5cm. 22

22 { Tan then pale, stem *white*, glabrous, *naked* *H. nudipes* Fr.
Gilvous, disc darker, *edge blackening*; stem fibrillosely striate, pale *rufescent* *H. capnocephalum* Fr.

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Hygrophorus Fries.

(THE SPECIES OCCUR MOSTLY AMONG GRASS AND ARE OFTEN BRIGHTLY COLOURED.)

1 { Viscid ; veil *floccuse* ; stem *scabrid* near the apex ; gills adnato-decurrent (*Section* Zimacium) 2
Moist, *not viscid, firm*; veil *absent* ; stem not scabrid, gills distant, arcuate (*Sect.* Camarophyllus) 19
Viscid then dry, *fragile, watery* ; veil *absent.* Mostly brightly coloured (*Sect.* Hygrocybe) ... 36

2 { Pileus white ; gills decurrent. In woods 3
Pileus white tinged yellowish or *pallid* yellow ... 4
Pileus reddish or rufescent 7
Pileus tawny, yellow, or cinnamon 9
Pileus olivaceous-umber, umber-grey, or yellowish-olive 12
Pileus grey tinged brownish, or livid grey 15

3 { 3-5cm., every part weite : stem viscid *H. eburneus* Fr.
1-2cm.; stem *powdered with rosy-meal* *H. pulverulentus* B. & Br.

4 { 5-7 cm., white, with margin, gills and stem apex *yellowish*, smell unpleasant....*H. chrysodon* Fr.
4-6cm., white then *yellowish disc deeper*, edge of pileus, gills and stem *soon reddish-brown* *H. discoxanthus* Rea.
Without these features 5

5 { Smell *strong* ; white, yellowish in parts, 3-5cm. *H. cossus* Fr.
Smell *weak and agreeable.* Pallid tan or straw colour 6

6 { Every part tinged *pale straw colour*, 5-7cm. *H. melizeus* Fr.
Pallid tan, gills paler, stem whitish, rooting *H. penarius* Fr.

7 { Disc rugosely punctate. Stem ventricose H. *glutinifer* Fr.
Withoutt these characters. Pileus not pelliculose ... 8

8 { White but suffused *dingy-red or rosy*, 5-12cm.; gills white *spotted red* ; stem red-fibrillose *H. erubescens* Fr.
Clear vermilion flesh-colour, gills *pure white* *H. pudorinus* Fr.

9 { Tawny, virgate, *stem apex with free granules* *H. arbustivus* Fr.
Apex of stem without *free* white mealy granules ... 10

10 { Golden yellow, 3cm., stem reddish *glutinous*..*H. aureus* Arrh.
Pileus not golden yellow... 11

11 { Pale gilvous, disc darker, rusty, 3-5cm. *H. discoideus* Fr.
Cinnamon, *fragile*, glutinous, gills *tinged pink* *H. aromaticus* Bk.

12 { Gills *shining white*, pileus olive-brown, 3-5cm., stem glabrous above floccose ring *H. olivaceo-albus* Fr.
Gills greyish-white or tinged yellow or pink 13

13 { Smell strong like cherry-laurel. Umber then greyish, 2-3cm.. stem *attenuate below* ... *H. cerasinus* Berk.
Peculiar smell absent ; stem almost equal; pileus 3-6cm. 14

14 { Umber to smoky olive ; gills *greyish* ... *H. limacinus* Fr.
Greyish then yellowish-olive, gills tinged yellow-pink, stem floccose, solid ... *H. hypothejus* Fr.

15 { Pileus everywhere livid-grey, 3-6cm.; gills white ... 16
Pileus greyish, tinged brown, at least at the disc ... 17

16 { Disc with *pellucid papillæ*; gibbous; stem *rough*, fibrillosely *striate* ... *H. agathosmus* Fr.
Not papillate ; stem smooth, even ... *H. livido-albus* Fr.

17 { 2-5cm., disc *papillate*, stem *black-punctate*.*H. pustulatus* Fr.
Not papillate; stem not rough with black points ... 18

18 { Brownish to grey, 4-5cm.; spores 12-14 x 7-8 *H. fusco-albus* Fr.
Whitish, disc brown, 2-3cm, *striate*, sp 10 x 5 *H. mesotephrus* Bk.

19 { Gills deeply and at length obconically decurrent ... 20
Ventricose, sinuato-arcuate, adnate, or with a tooth 29

20 { Pileus white or whitish 21
Grey, gills same, stem pale *H. pratensis var. cinereus* Fr.
Reddish-yellow, tawny or buff, or drying greenish ... 24
Sooty-brown to blackish or umber 29

21 { Gills *yellow*, stem solid, wavy ...*H. Karstenii* Sacc. & Cub.
Gills white 22

22 { *Fragrant, convex*, disc fleshy, 2cm. *H. russo-coriaceus* B. & Br.
Without fragrant odour 23

(To be continued.)

REVIEW.

"A MONOGRAPH OF BRITISH LICHENS, a descriptive catalogue of the species in the British Museum." Part II. By Annie Lorraine Smith, F.L.S. Printed by order of the Trustees of the British Museum, 1911. Price 21s.

Students of Lichens in this country have for many years been at a disadvantage in not having a complete and up-to-date handbook dealing with the British species. The advent of this handsome volume removes a serious drawback to an interesting field of study, and will serve to stimulate the investigation of the distribution of our lichens, which has been languishing for a long period. When Crombie's *British Lichens* (which included only a moiety of the species) was issued, the second volume was promised at an early date. Between this promise and its fulfilment 16 years have elapsed. Lichenologists have grumbled and chafed during the interval, and even ventured to make disagreeable remarks anent the "starvation of science," and the "stingy government" of this country. The cause of the delay is explained in an introductory note to the new volume. Unavoidable and regrettable though it was, it has somewhat marred the symmetry of the whole work by necessitating a different system of classification from that outlined at the commencement.

There are, however, compensating advantages in the incorporation of the latest information, and in the fact that the completion of the work has devolved upon one so eminently capable and sympathetic as Miss Annie Lorraine Smith. The linking up Zahlbruckner's scheme of classification with that adopted by Crombie has been very successfully and ingeniously accomplished. Some of the large and unwieldy old genera, such as Lecidea and Verrucaria, have been divided, and we see once more some of the welcome old generic names used by Massalongo and Mudd, who justly attached more importance to characters

derived from the spores than formvariations of the thallus. In accordance with modern ideas, due notice is paid to the algal symbiont in the generic characters.

Although the work is modestly described as "a descriptive catalogue" of the species in the National collection, it is really a complete monograph and valuable student's handbook of the British Lichen Flora, giving the distinguishing characters, synonymy, habits, and distribution of each species, and it is likely to be the *vade mecum* of the British student for many years to come.

The very complete index, both to adopted names and synonyms, including also those in the first volume, will be very welcome The lack of such an index seriously marred the utility of the first part. Some recent additions to the genera dealt with in Crombie's work are included in an appendix.

A word of praise must be given to the very valuable series of plates, 59 in number, illustrating every genus, which have been admirably drawn by Mr. Highley, and which will be most useful to the student.

Botanists will be thankful to the Trustees of the British Museum for the issue of so excellent a volume, and they are to be congratnlated on having secured as authoress so talented a cryptogamist as Miss A. L. Smith. She has grappled with a difficult task in a workmanlike manner, and has judiciously included a number of little known endemic species which we may now hope to have carefully investigated and their true status worked out.

J.A.W.

—o—

Messrs. Flatters & Garnett exhibited preparations and apparatus at the exhibition in connection with the Liverpool Microscopical Society, and Thomas Armstrong & Brother had a show of instruments.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Lathyræa squamaria in Cheshire.

On the 26th of March last, Mr. Charles Hill, of Warrington, brought me a plant for identification which he gathered in Aston Wood, near the River Weaver, on the estate of Harwood Banner, Esq., M.P. It proved to be the Toothwort (*Lathræa squamaria* Linn.) This plant is not recorded by Lord De Tabley for West Cheshire, and is an interesting addition to the local flora. Mr. Hill tells me the plant was fairly plentiful.

G. A. Dunlop.

—o—

Æcidium leucospermum D.C. in North Wales.

Among the fungi collected at the meeting of the Liverpool Naturalists' Field Club at Wynnstay Park on the 29th ult., this species of "cluster cup" deserves notice. The æcidia form *white* pustules scattered over the underside of the leaves of the Wood Anemone, and it has been thought to be a further stage in the development of *Puccinia fusca*, which forms blackish tufts of teleutospores on the same plant. Dr. Plowright, however, considers that there is not sufficient biological evidence for this opinion, the *Puccinia* being very common in Britain, while the *Æcidium* is rare. It is this last statement that has led me to record its occurrence in North Wales.

John W. Ellis.

——o——

In the immediate district of Tandlehill—a beauty spot well-known to our Oldham naturalists—a stray dog of the collie breed has been roaming about during the past winter. At the beginning of April a litter of *eleven* puppies was found occupying a couple of large rabbit burrows. The puppies were seven or eight weeks old, and were the progeny of this canine visitor. Both mother and young seemed in excellent health. Some difficulty was experienced in capturing the latter, while the former is still running wild in the vicinity.

J. W. Kent.

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Quaint Old Cottages in Scorton Village.

REFERENCE LIBRARY, SALFORD, PEEL PARK,

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Montia verna Necker in Cheshire.

In a very interesting note on the "Seed-forms of *Montia fontana* L.," by Mr. W. G. Travis, which appeared in this Journal, 1910, the writer stated that in all probability *Montia lamprosperma* Cham. was the only segregate to be found in Lancashire, and that it remained to be seen whether the southern form with dull black tuberculate seeds, *i.e.*, *M. verna*, occurs as well. Whilst on a visit to Burton Point, in the Wirral, early in May this year, I gathered *M. verna* growing on the sandstone rocks close to the shore and associated with *Cerastium tetrandum* Curt.

I sent specimens of the plant to Mr. G. C. Druce, and he agreed with me that they are typical *verna*.

This is a very interesting indication of the northern extension of the distribution of this species, which, so far as I can learn, has hitherto only been recorded for the southern counties, and seems to show that there is every likelihood of its being found in the neighbouring portions of South Lancashire.

WM. HODGE.

—o—

The *Transactions of the British Mycological Society* for 1910 contains reports of the Society's Forays held last year at Chester and Wrexham; the presidential address by Harold Wager, F.R.S., dealing with problems connected with the morphology and physiology of fungi; new or rare micro-fungi by Miss A. Lorrain Smith; new and rare British fungi by Carleton Rea; and other interesting articles. There are also three finely coloured plates.

—o—

Those of our readers who sent in answers to the enigma contained in the report of the Liverpool Naturalists' Field Club last month were correct in all cases. The plant was *Chrysosplenium oppositifolium*.

—o—

BRIDGE AT LEVENS.—Our illustration, which we reproduce by kind permission of the "Gazette" Press, Darwen, is from a photo. taken on a recent visit by the Blackburn tradesmen.

C.G. desires information in respect of a canal bridge at Ratcliffe Wharfe, Forton. Embedded in the bridge are many stones on which are stamped initials. These initials are said to be those of the mason responsible for the work. The curious feature about this one bridge is that so many occur in its arch. Our correspondent believes that some record of the bridge has been made by a Bolton clergyman.

—o—

G.B. reports the occurrence of *Abraxas ulmata* in large quantities near Halton, and also a new locality where *Euchleo cardamines* has been seen in fair numbers during this season.

—o—

The Blackburn Field Club had a delightful ramble to Hesketh Bank on June 17th, where the marsh occupied the early part of the afternoon. The chief attraction was the second portion, when the branch canal from Rufford to Tarleton was visited. At the Tarleton end the canal is sandwiched between the dirty Douglas on the one hand and an old railway cutting on the other. Apparently there has been at one time a sort of harbour here. It is now all but deserted. To the botanist this length offers great attractions. It escapes the too close cropping so often meted out to the other vegetation, and consequently it is far richer than any part about in the grasses, sedges, and rushes. At the time of our visit the broad-leaved pond-weed and the yellow water-lily covered the surface with leaves, the rosy-red flowers of the former contrasting well with the golden cup-like ones of the water-lily just emerging from the water. The event of the day was the finding of a long line of the flowering rush close by the banks. This was new to most of the party. One of the reeds grew quite six feet in height, and nestling at the foot the greater skullcap and other plants gave a touch of colour. Could any of your readers give any further information about this old harbour.

(COMMUNICATED.)

Ninety per cent. of the failures in examinations in botany are directly traceable to lack of knowledge in the field. The questions presenting the greatest difficulties are often those which the cursory knowledge of plants in their natural habitats would have surmounted. There has been in recent years an effort made to improve this. In some cases the botany classes are being extended over the summer months in order to give the pupils an opportunity of taking combined rambles. In other cases the students are banding themselves together independent of the classes. This is bound to have a beneficial effect. It will at the same time brighten the work. One very successful teacher in Lancashire attributes his success entirely to the opportunities he has had of taking his pupils on rambles.

—o—

Very active in this direction have been the Manchester Technical School botanists, who by successive outings on recent Saturdays have made themselves familiar with the flowers as they have appeared in their due season. On May 13th they were at Baguley, on the 27th at Sale Meadows, and the first Saturday in June saw them at Dunham Park.

—o—

Aviaries in public places have as a rule short lives. So frequent have been the failures that it is rarely now that they are ventured upon. Two in Lancashire stand out as complete successes—one at Stonyhurst College and the other in Bold Venture Park, Darwen. This latter, of course, has had to be replenished from time to time, and a recent addition has been made, not only of birds, but of other things such as lizards.

—

What is the origin of the phrase "lowking" as applied to weeding in West Lancashire.—W.

BOTANICAL EXCURSION TO FRODSHAM.

The continued drought enabled the members of the Liverpool Botanical Society to see Frodsham Marsh, the place selected for the June excursion, under unusual conditions. Even the largest ditches contained very little water, and some of the smaller ones could be crossed without wetting the feet. It was curious to note the effect of these untoward conditions on some of the moisture loving species. *Carex riparia* was much reduced in stature, and *Polygonum hydropiper* and *Veronica anagallis* looked very sickly. On the other hand *Catabrosa aquatica*, *Myosotis repens*, *M. cæspitosa*, and *Equisetum limosum* appeared to be even more luxuriant than usual, and the temporary drying of the habitat seemed to have no adverse effect. Seven species of *Carex* were noted, and four of *Lemna*. Other interesting hygrophiles seen were *Elodea canadensis*, *Ranunculus sceleratus*, *Hydrocharis Morsus-ranæ*, *Œnanthe fistulosa*, *Scutellaria galericulata*, *Rumex hydrolapathum*, *Samolus Valerandi*, *Sagittaria Sagittæfolia*, and *Eleocharis uniglumis*. Some of the meadows were enlivened by numerous patches of *Genista tinctoria*, with here and there *Orchis latifolia* and *O. maculata*. It was too early for Rubi, and the only species determined were *R. Lindleianus*, *R. Selneri*, *R. dumetorum*, and *R. cæsius*. Mosses were very scarce. Those seen included *Drepanocladus polycarpus*, *Webera carnea*, *Amblystegium varium*, *A. serpens*. The only two hepatics seen were *Lunularia cruciata* and *Kantia arguta*.

After tea a brief visit was paid to the slope of the sandstone hill behind the town. The sandstone was found to be sparingly peat-covered, the dominant plants being—in order of frequency—*Pteris aquilina*, *Vaccinium myrtillus*, *Deschampsia flexuosa*, and *Calluna erica*. These were frequently intermixed with *Galium saxatile*, *Ulex europæus*, *Erica cinerea*, and *Rubus dasyphyllus*. One or two other species of *Rubus* were not advanced enough to be named. A few bushes of *Cytisus scoparius* and *Pyrus aucuparia* were scattered about, and beneath their shade *Dicranella heteromalla* was in places fairly abundant. No suitable habitat for *Schistostega osmundacea* was seen in the few minutes we spent upon this hillside, although it occurs in the immediate vicinity.

The only fungi seen were *Fomes fomentarius*, *Polystictus hirsutus* Fr., and *Puccinia Hieracii*, whilst *Lecanora citrina* was the only lichen observed.

SOCIAL GROUPS AND ADAPTIVE CHARACTERS IN THE BRYOPHYTA.

By J. A. Wheldon, F.L.S.

(Continued from page 43.)

only 3cm. in length. This species fruits so rarely here (if at all) that it would not be too much to postulate that these small growths, as perhaps all the other H. *pseudofluitans* in the same "slack" of the dunes, belonged not only to the same species, but were portions of *the same individual!* Dr. Carrington found *Fissidens adiantoides* growing in large mats in running water on Torc Mountain, individual stems reaching as much as 10 inches in length, and on the dry limestone rocks near Silverdale it may be seen about 4 lines high! When one considers these, and commonly occurring examples of similar variations in such species as *Barbula tophacea*, *Grimmia apocarpa*, *Webera albicans*, *Hypnum elodes*, *Eurynchium rusciforme*, *Amblystegium riparium*, *Cinclidotus fontinaloides*, *Diplophyllum albicans*, *Lophozia inflata*, and *Nardia scalaris*, which exhibit well-marked fluctuations in height, one is led to gravely doubt the validity of such varieties as the following:—*Sphagnum papillosum var. confertum*, *Catharinea undulata var. minor*, *Dicranum Schreberi var. elata*, *Polytrichnm urnigerum var. humile*, *Cynodontium Wahlenbergii var. compactum*, *Dricanella cerviculata var. pusilla*, *Campylopus flexuosus var. nliginosus*, *Fissidens adiantoides var. collinus*, *Webera Ludwigii var. elata*, *Webera albicansvar.glacialis*, *Bryum argenteum var.majus*, *Mnium affine var. elatum*, *Eurynchium rusciforme var. inundatum*, *Hypnum polygamum*, *var. stagnatum*, *H. vernicosum var. majus*, and *Hypnum Eugyrium var. Mackaii*. Many other mosses, and a great many named varieties of hepaticæ, ought probably to be included with the above.

The Sphagna are peculiarly adapted for water absorption, having one or more layers of large cistern-like cells on the outside of the stems and branches (Fig. 9), with pores to allow

the water to pass, and sometimes with strengthening spiral fibres in the cell walls. Some other mosses exhibit enlarged thin-walled cortical cells especially adapted for water storage, as, for instance, H*ypnnm revolvens* and H. *intermedinm*. In the Sphagna several branches in each fascicle are usually deflexed and closely appressed to the stem, thus answering one of the purposes of rhizoids (which are quite absent) in retaining moisture around the plants.

The usual arrangement of the leaves in regular overlapping series (Fig. 20) also furthers this object, especially when the interspaces are occupied by rhizoids and paraphyllia. The apex of growing shoots, where the greatest physiological activity occurs, is usually protected by densely overlapping and closely convolute layers of leaves, the young and tender internal ones being thus guarded against both frost and excessive transpiration. Many tufted mosses growing in open places have long, pointed leaves, which in dry weather are closely appressed to the stem, the cuspidate apices of which present themselves as foci for the condensation of dew (Fig. 18), which drains down the stems, some being retained in the concavity of the leaves. These latter are often hygroscopic, and become more patent when moistened, and are then better enabled to retain any water that runs down to them.

This hygroscopicity of leaves is exhibited in an extremely marked degree by many mosses which grow on exposed rocks, walls, or tree trunks, where they are subject to periods of extreme drought. Every little device for retaining moisture is in their case of the utmost importance. In addition to closely tufted growth, dense foliation of stems, and recurved leaf margins, the leaves curl or twist in various ways when dry, presenting a smaller area to wind and sun. In some of them the leaves have their faces pressed closely to the stems, as in *Pseudoleskea catenulata*, *Leucodon sciuroides*, *Orthotrichum rupestre*, *Ulota Hutchinsiæ*, *Rhacomitrium patens*, *Grimmia homodictyon*, *Hedwigia imberbis*, *Weissia verticillata*, *Andreæa alpina*,

and many others. Compactly twisted leaves, giving the whole plant the appearance of a twisted cable, are seen in *Grimmia funalis* (Fig. 18 the dry plant, Fig. 19 the same moistened), *G. torquata*, *Tortula lævipila*, *Barbula revoluta*, and *Bryum capillare*. Curling, crisping, and variously contorted leaves are still more common. In *Leptodon Smithii*, and to a lesser extent in *Porotrichnm alopecurum*, the stems and branches roll up in a spirally involute manner when dry, exactly as they do in the desert plant sold in shops as the "Rose of Jericho." The leaves of Polytrichum, and those of the Aloidella section of Tortula, have the active assimilating tissue concentrated in the median line, and in dry weather the margins become inflexed, and thus assist in the retention of moisture. Another xerophytic device, common in mosses found on walls and dry sandhills, is recurving of the leaf margin. This may be seen in *Tortula muralis* (Fig. 28), *Barbula revoluta*, *B. Hornschuchiana*, and many others.

The leaves of the true mosses exhibit but little structural modification, and their shapes are relatively uniform. The cells in a few species which grow in shaded, warm, and moist localities, are large and thin walled, as in *Pterigophyllum luceus* and *Hookeria laete-virens*, and such species attain their greater development in southern districts. In exposed and alpine situations the cell walls are often thickened, and the area of the lumen diminished, as in *Andreæa*, *Grimmia*, and *Leskea*; very often the cells bear one or more thickened projections or papillæ; and reduction of the leaf lamina not unfreqnently occurs, as in *Andreæa crassinervia* and *Polytrichum*. In the latter genus, as if to compensate for the much reduced lamina, the nerve is closely covered by erect longitudinal plates, consisting of highly chlorophyllose cells, and Kerner has shown how the position of these is modified in dry weather to prevent evaporation. In *Catharinea* (Fig. 10) the nerve is narrower and the leaf blade wider, and the lamellæ are fewer and form a much smaller proportion of the bulk of the leaf. A form of *Polytrichum*

gracile occurs in damp places, in which the lamellæ are much reduced and the leaf lamina widened as in *Catharinea*. These modifications, according to Mr. Dixon, are probably due to an abundant supply of moisture, and they cause the plant to so closely approach the allied genus *Catharinea*, that in the absence of fruit it was at first described as a new species of that genus under the name of *Catharinea Dixoni*.[15].

The leaf of *Leucobryum glaucum* shows an anomalous structure, the cells being bistratose, except a single row at the margin. Some regard this leaf as consisting entirely of nerve, the row of marginal cells representing a reduced lamina. Stratification of the cells does not, however, necessarily imply that the tissue should be regarded as "nerve" tissue, either in *Leucobryum* or *Aneura*. The leaf-cells of the lamina are not unfrequently arranged in two or more strata in the upper portion of the leaf in some of the *Grimmiæ*, *e.g.*, *G. pilosissima* (Fig. 11A), *G. funalis*, *G. decipiens*, *G. elatior*, *G. patens*, *G. ovata*, *G. commutata*, *Coscinodon cribrosus*, and *Campylostelium saxicola*; similar arrangement may be seen in *Diphyscium foliosum* and *Orthotrichum rupestre* (Fig. 11B). All these species are liable at times to be exposed to strong drying winds and hot sunshine, and this thickening of the leaf blade, a rare feature in the Bryophyta, seems to be of especial utility, occurring as it does in the upper half of the leaf, which is the only portion exposed when the plant is dry and the leaves are closely imbricated.

The basal cells, which are the least exposed, are very often much enlarged and their walls thinner, and at the lower angles of the leaf they are quite commonly much inflated or vescicular. (Fig. 15.). These latter are probably specialised for the storage of water, as they are frequently almost devoid of contents, and appear to have ceased to carry out the functions of ordinary cells. Their position next the stem, amongst the rhizoids of which they often nestle, is peculiarly favourable for collecting moisture.

The very remarkable arrangement of the chlorophyllose cells in the leaf of *Sphagnum* calls for special mention. As a rule each one lies between two much larger cistern-cells, and the walls of the latter are frequently perforated by pores for the admission of water. The Sphagnum plant is thus enabled to rapidly absorb large quantities of moisture, and store it against periods of dryness. The assimilative cells are sometimes entirely enclosed by the hyaline ones (Fig. 8B), at others they emerge on the upper (Fig. 8A) or undersides of the leaf, and these various arrangements appear to be constant according to the species, whatever the local conditions of environment may be. Their relative position, therefore, affords valuable specific characters. In some submerged forms, such as *Sphagnum cuspidatum* and its allies, the chlorophyllose cells are widened and the hyaline ones narrowed to such an extent that the former predominate, and occupy the greater part of the lamina. *Sphagnum medium*, which seldom grows completely submerged, and is less restricted to very wet places than some of its congeners, is noted for having its chlorophyllose cells completely enclosed on both sides of the leaf (Fig. 8B).

In comparison with the mosses, the hepatics are found to exhibit much greater diversity in the morphology of their leaves, whereas their fruiting arrangements show greater uniformity and simplicity. The gametophore varies from a simple cellular expansion in *Aneura*, *Pellia*, and *Anthoceros*, to a highly specialised thallus in *Marchantia*; and from a spirally frilled stem in *Riella*, to a distinct leafy axis, having leaves of very diverse shapes, in the Acrogynous hepaticæ. Many of the *Marchantiaceæ* exhibit distinctly protective contrivances against drought. Air chambers are common, opening by pores with or without guard cells, in species which sometimes grow in dry, sunny situations, as *Marchantia polymorpha*, *Targionia hypophylla*, and *Conocephalus conicus*. Under more aquatic conditions the air chambers are much reduced, and the pores are fewer, as for instance in *Marchantia polymorpha var.*

aquatica, and in *Monoclea* and *Dumortiera*, plants of strongly hygrophilous character, they are completely wanting. In the two latter genera the ventral scales about to be mentioned are also absent. In *Riccia*, *Targionia*, *Preissia*, and *Reboulia* the margins of the thallus bend inwards when dry, until in some species the plant is almost tubular. The chlorophyllose layer of cells which lies near the dorsal surface becomes enclosed, and the ventral surface is presented to the light. The under side so exposed, consists of one or more strata of empty cells, covered by scaly plates. This rolling up of the thallus is due, in *Grimaldia dichotoma*, according to Mattirolo, to the cell walls of the ventral tissue being mucilaginous, hence on losing water they shrink, and on taking it up they expand again. The difference between the aspect of some of these plants in the moist and dry states is very marked. Some of the thalloid hepatics assume a thickened and leathery consistence under xerophytic conditions, as Mr. Nicholson has pointed out in the case of *Lunularia vulgaris*, and the same may be observed in *Marchantia* and *Conocephalus*. Narrow, very fleshy specimens of *Riccia glauca*, which at first were thought to strongly approach *R. sorocarpa*, when grown in a damp shady greenhouse became broader and thinner, almost recalling in habit some forms of *R. glaucescens*.

Riciella fluitans is almost eradiculose when floating in an abundant water supply, but when stranded on mud in times of drought, it develops a copious quantity of rhizoids. It then forms a densely intricate sheet overlying the mud, from which the rhizoids obtain sufficient moisture for the needs of the plant.

In the Acrogynous hepatics the base of the leaf often becomes somewhat ventricose, forming a small water-containing receptacle, as in *Aplozia cordifolia* (Fig. 13) and *Mylia anomala*. In the *Lejeuniæ* one of the basal wings of the leaf is turned in, forming a more or less distinct lobe which clasps the stem and receives any moisture which trickles down. Mr. Travis pointed out to me that the leaves and amphigastria are frequently so

arranged, that the water trickles down in a spiral manner from one to the other, so that, until all the axils are full, none is lost. In *Peltolejeunia* the postical lobe is rolled inwards in a circinate manner, resembling a scroll (Fig. 12), and in *Colurolejeunia* the whole leaf forms a pouch-like body. Many tropical epiphytic hepatics have tubular leaf lobes, which act as reservoirs of moisture. Some of these are provided with valve-like lids which open inwards, but not outwards, and Schiffner and Campbell suggest that these may act as insect traps.[12]

Despite these varied modifications to secure and safeguard moisture, many of the Bryophyta, in districts where the rainfall is meagre, are driven to take refuge in very shaded places, such as deep cuttings, caves, and clefts of rocks. Here they are frequently only able to exist through a certain adaptability, by which they utilise to the fullest extent the diminished illumination. In such situations the normal close and regularly imbricate arrangement of the leaves is modified, and they become widely patent and distant from each other. (Figs. 20-21.) If the stems are procumbent (and species with normally erect stems frequently become prostrate under adverse conditions as to light), a pseudo-distichous arrangement is assumed. This dorsi-ventral flattening appears to be normal in shade-loving genera like *Schistostega*, *Plagiothecium*, *Neckera*, *Pterigophyllum*, and *Homalia*, and in the liverworts it is a very frequent feature. It may be traced in its origin from the completely thalloid forms, through *Blasia* and *Fossembronia*, to the Acrogynous species, in many of which this habit of growth has resulted in the third or ventral series of leaves being reduced to mere appendages or amphigastria, the remainlng two series spreading their surfaces to the light in two distichous rows.

In *Fissidens* the leaves clasp the stem, their two halves being erect and applied face to face. They are strictly two-ranked, originating (the only instance among the mosses) from a two-sided apical cell. This transverse arrangement, admirably adapted for the conservation of moisture, tends to deprive half

the leaf surface of its due share of light. To meet this the nerve of the leaf has become greatly prolonged, and has developed an extraordinary adventitious tissue for assimilative purposes, known in its upper half as the superior, and in its lower half as the dorsal lamina. These are arranged in a plane at right angles to that of the leaves, and thus present the greatest possible amount of chlorophyllose tissue to the light. (Fig. 16). *Schistostega* attains the same end by a longitudinal attachment of the leaves to the stem. The leaf bases are connate, and the whole gametophore resembles on a small scale the frond of *Polypodium vulgare* (Fig. 17).

Many mosses which are driven by droughty conditions to assume a compactly tufted habit, show a marked difference in the appearance of the stems of the centre and those of the circumference of the tufts. The latter are less erect, their leaves are often more complanate, and the branching becomes more pinnate. Mr. Dixon records an instance of this in *Hypnum Bambergeri* in the Western Highlands, and Mr. Ingham attributes the occurrence of very pinnate branching of *H. aduncum* to the horizontal position assumed by the stems when the pools in which they grow dry up.

(To be continued.)

The annual report of the observations at the Fernley Observatory, Southport, has just been published and affords a comprehensive sketch of the valuable work performed at this place by Mr. J. Baxendell and his staff. The measurement of sunshine duration cards is a matter in which Southport has a business as well as a scientific interest, and Mr. Baxendell has a paragraph or two in his report dealing with this much-discussed subject. The interesting meteorological observations made at Southport are tabulated with great care, and the work of the department cannot but be of considerable value to weather science generally.

REFERENCE LIBRARY SALFORD PEEL PARK

A RAMBLE BY A FORMBY DITCH.

By E. Reid.

(Continued from page 44.)

One has now a splendid opportunity of noticing the beauty of the leaves, especially of the graceful, feathery leaf-whorls of the water violet (*Hottonia palustris*), which is, indeed, in some parts of the country, called Feather-foil on this account.

The leaves of aquatic plants are very simple in form, as this shape offers less resistance to the passage of water than if they were composed of spreading lobes. The thread-like form, moreover, allows them to turn readily with the current, offering little surface for the stream to act upon.

Before spring has far advanced the sides of the ditches and the neighbouring meadows will be gorgeous to behold with the brilliant cups of the marsh marigold (*Caltha palustris*). King-cups, too, the children call them, and they are in truth golden cups fit for a very King Midas. Yet another name for them is marigold, this being one of the flowers dedicated to the Virgin Mary. In the south country they are often called Bull Flowers, but this is probably only a lazy pronunciation of "pool" flowers, and sometimes they are called mere blobs. An old writer tells us, that if king-cups be plucked with due care and borne about the finder, no one will speak an angry word to him that day. This flower was, in olden days, employed by country people for strewing before their doors and weaving into garlands on May Day. They were, however, put to a practical use as well, for the flower-buds were used as a substitute for capers.

Choosing, like marigolds, moist, low-lying ground, the *Cardamine pratensis*, or cuckoo-flower, grows on the border of the ditch, indeed we always associate these two flowers, and the glossy brilliant yellow of the *Caltha* forms a delightful foil to the delicate mauve blossoms of the graceful cuckoo-flower. The pinnate leaves are as choice in their way as the blossom. *Cardamine pratensis* belongs to the large family of cresses,

another member of which, *Nasturtium officinalis*, or water-cress, we shall find growing most profusely in the ditches during the months of June, July, and August, and adorning them with pretty white flowers and leaf-tracery.

Cardamine pratensis, or bitter cress, like its relative water-cress, is, on account of its pungent flavour, much appreciated as salad, and in many parts of the Continent it is no uncommon sight to see great bundles of it displayed in the market-place among other vegetables. In olden times it was considered a potent remedy for such ills as hysteria and epilepsy, but faith in the virtue of simples has almost died out.

Cresses have from very early times been noted as an esculent food, for Rollin, the historian of ancient history, tells us that the great Cyrus the Persian was brought up on bread, cresses, and water. More than one proverb attaches itself to the cresses. "He isn't worth a curse" sounds rather shocking, but it is really not as vulgar as it sounds, for the word "curse" is only the word "cress" transmogrified. Referring to the refreshing nature of these foods, too, the Greeks had a proverb "Eat cress to learn more wit." It is a far cry from the Greeks to the modern food-reformers, but they would heartily endorse this advice.

When the beauty of the cuckoo-flower and marsh marigold is on the wane, the lesser spearwort (*Ranunculus flammula*) will be gilding the boggy ground drained by the ditches, looking remarkably like a small buttercup at a short distance, although a nearer examination will reveal the simple narrow leaves from which it derives its popular name. The greater spearwort (*R. lingua*) I have not found there, though it probably will grow somewhere in the neighbourhood. I must merely mention the weedy trophies that grow beside the ditch's trembling brim, such as the delicate bog stitchwort (*Stellaria uliginosa*), the forget-me-not (*Myosotis palustris*), which the Brahmins say is worthy of a place in Paradise, the pretty little eyebright (*Euphrasia officinalis*), the purple orchis (*Orchis mascula*), the "long purples" which poor Ophelia wove into her chaplet, the

Ragged Robin (*flos-cuculi*)—indeed but to tell their name is "to recite a poem of grace and light," for there's a daintiness about these early flowers that touches one like poetry. I must come now to the plants that grow actually in the ditch itself.

Here we will find more than one member of that large and interesting family, the Crowfoots, the tribe that delights in froggy places. Here grows the *Ranunculus sceleratus*, or celery-leaved crowfoot, the plant which is used by gentlemen of the road to raise blisters on their feet, vieing with the Gibeonites of old in trying to make the charitable believe that they have come a long way on foot.

Exquisitely dainty are the water crowfoots, of which we shall find several varieties. Nothing could exceed in elegance the delicate purity of the snowy-white blossoms of *Ranunculus floribundus* floating on the water, or of *Ranunculus circinatus*, whose fragile blossoms are so distinctly seen against the boggy mud. The petals are so delicate that they cannot be distinguished against the paper.

The foliage leaves of these plants illustrate very strikingly how plants adapt themselves to their habitat. In the case of *Ranunculus drouetti*, the leaves are entirely submerged, so we see them thread-like; in the case of *Ranunculus floribundus* some are submerged, while those which grow on the surface of the water are crenate; in *Ranunculus circinatus* they are thread-like.

Later in the summer we shall find another member of the Ranunculus family, *Thalictrum flavum*, or meadow rue, fluttering on the brink of the ditch. This member has struck out a new line for itself to ensure pollination, for unlike its sprightly cousins, the buttercups, which are largely visited by insects, the meadow rue depends principally on the wind for dispersion of its pollen. It pays the penalty, however, for its originality, by being much less striking—not to say dull—in its appearance. The way in which its anthers successively open, turn, and twist is of extreme interest to the botanist.

In the ditches, too, we find an equally interesting variety of speedwells, namely, *Veronica beccabunga* (brooklime), with its rounded leaves and pale blue flowers ; *Veronica anagallis* (water speedwell), with its flesh-coloured or blue flowers and slender racemes, and *Veronica scutellata* (marsh speedwell) with its slender glabrous leaves and pinkish flowers.

Quite one of the loveliest and most striking of ditch plants is the water violet (*Hottonia palustris*), to which reference has already been made. The flowers are of a delicate violet colour, the only point, by the way, in which it resembles the violet, for it belongs not to the order Violaceæ, but to Primulaceæ. The flowers grow in whorls round a rather tall spike "in a straight line still upward bent as if heaven were its own." These ærial stalks prove that it was once a terrestrial plant.

A more beautiful sight than great patches of these lovely lilac-purple flower spikes, rising up proudly from the surface of the water, can hardly be imagined. The name *Hottonia* was given to it in honour of a Leyden professor. The flower of the water violet, apart from its exquisite beauty, is especially interesting on account of its structure, and I commend it to the botanists who may be fortunate enough to find it.

In May and June, the yellow iris (*Iris pseud-acorus*) will claim our attention. This is one of the most conspicuous and handsome of plants, but the blossom is of unusual interest from a botanical point of view, owing to the curiously modified form of the stigmas and perianth, as well as in other directions. The flower rejoices in many names. The name "flag" has no doubt been suggested by the fluttering in the breeze of the outer segments of the perianth. "Segg," another of its names, refers to its sword-like leaves (the edges of which transmit the light so strikingly), the A.S. for a small sword being segg.

As Fleur-de-luce, it is much employed in heraldry ; and as a symbol of power the Egyptians placed an iris on the brow of the Sphinx, and also on the sceptre of their kings, the three leaflets signifying wisdom, faith, and valour.

Much more prosaic is the use to which the root is put, namely, in the making of dye and of ink, while one of its near Italian relatives produces the famous perfume, orris (*i.e.*, iris) root. The leaves, too, make excellent thatch and rush chairs, and the seeds of the pods, which, by the way, are conspicuous by their great size and shape, are roasted as a substitute for coffee.

We can give but a nod in passing to many other aquatic treasures which also grow right in the ditch, each beautiful, each interesting.

Here we have, for example, the russet browny-red marsh cinquefoil (*Comarum palustris*), which harmonises so charmingly with the sweet forget-me-not that nestles at its foot ; the procumbent marshwort (*Apium nodiflorum*), so often mistaken for watercress ; the dropworts—*Œnanthe phellandrium* ; the poisonous hemlock water dropwort (*Œnanthe crocata*); the great willow herb (*Epilobium hirsutum*), with its showy pink flowers and delicate fragrance, and which is a near relative of that handsome plant, the fuchsia ; *Œnanthe fistulosa*, with its curious tubular stem-like leaves, and globular fruit ; *Apium graveolens* (wild celery) ; *Alisma plantago* (water plantain), with its handsome leaves which give to the plant its name, from the fancied resemblance to the sole of the foot ; the floating pond-weed (*Potamogeton natans*), whose smaller leaves vie in grace of contour with its more majestic neighbour, the water plantain ; the fragrant mint (*Mentha hirsuta*) ; the handsome water dock (*Rumex hydrolapathum*), which at one time was largely used for adulterating tobacco; the sturdy, sociable bur-reeds (*Sparganium ramosum* and *Sparganium simplex*), with their globular heads of two varieties; nor must be omitted the gaunt rigid horsetail (*Equisetum limosum*) and its feathery friend, the mare's tail (*Hippuris nigris*), standing as erect in the water as the proverbial pike-staff. *Persicaria amphibium* and *Valerian officinalis*, too, with their dainty pink flowers, lend colour colour to the "sheucks."

In the month of July, we shall see a member of the Primulaceæ family, the rather uncommon flower, the great yellow loosestrife (*Lysimachia vulgaris*), whose panicled clusters of yellow flowers make such a pretty show, but the summer glory of the Formby ditches is undoubtedly the purple loosestrife (*Lythrum salicaria*), whose spikes are regal both in colour and dignity, and which are of unusual interest in possessing three different kinds of flowers. These vary according to the length of their style, some being short, some long, and some intermediate in length. The filaments of the stamens also differ in colour, and so do the pollen grains. (The yellow loosestrife, by the way, has two distinct forms of flowers).

The colour of the flower gives the name *Lythrum*, being the Greek name for the famous purple dye of the mollusc which produced the ancient royal purple ; and as to its popular name, loosestrife, the plant was in olden times supposed to stop strife, for Pliny says that if it be laid on the yoke of oxen when they are quarrelling, it will quieten them.

From spring onwards, needless to say, the rushes and sedges have been showing up in great variety, indeed

> ' They are for ever playing
> And twinkling in the light,
> And if a breeze be playing,
> That breeze they will invite."

Some of the most conspicuous of the rushes are *Juncus effusus* and *Juncus bufonius* (toad rush), these occurring with *Glyceria fluitans*, or floating meadow grass, one of the most graceful plants that grow in the ditch. Of the sedges *Carex goodenowi* (glaucous heath sedge), *Eleocharis palustris* (marsh spike rush), *Carex acutiformis*, *Carex vulpina* (great sedge), and the most beautiful of all, *Carex pseudo-cyperus*, with well-marked triangular stem and beautiful pendulous spikes. Among these we may put the true reed, *Phragmites communis*, one of the most widely distributed grasses in the whole world, being as common on the banks of the Ganges as it is on our ditch sides, and whose

feathery purple spikes make such a brave show. The leaves of sedges and rushes are so flexible, that they are not easily broken in the wind ; the epidermis is rather thick, to protect them from cold and to resist excessive evaporation, and they catch the low light from the water. The stems of rushes are cylindrical, while those of sedges are triangular in shape, one angle being pointed in the direction from which the water is flowing, on the same principle that engineers present an angle to the current in the pier of a bridge to break the force of the stream.

Another remarkable feature of rushes is that the flowering occurs in pulses. For some days, perhaps, no flowers will open. Then, suddenly, without apparently any change in the weather to account for it, the flowers will open together. This feature is more especially the case in those which have single or few flowers. The ancient custom of strewing rushes on the floors of houses, seems to have been universal. We read in an ancient chronicle that a certain William "holds three roods of land in the county of Buckingham by the service of finding straw for the bed of the Lord King, and to strew his chamber, and also of finding for the King when he comes, straw for his bed . . and grass or rushes to make his chamber pleasant." The picturesque custom of strewing rushes still lingers in the West, the floors of the churches on Whit Sunday being strewn with rushes. It was, too, until very recently, observed in Norwich Cathedral, the leaves of the yellow iris being used in seasons when rushes were scarce. Even to-day in some parts of Lancashire Rushbearing Sunday is still one of the joyous festivals of the year, and many of my readers will remember a picture which was exhibited in the Walker Art Gallery depicting the happy procession of children carrying rushes. In the late autumn, the golden flowers of the nodding bur-marigold (*Bidens cernua*) will invite us to wend our way once more to the ditches, but soon after their blossoms are shed, as George Herbert quaintly puts it,

"The flowers depart
To see their mother-roots where they have blown.
Where they together,
All the hard weather,
Dead to the world, keep house together."

And so we must leave them, although these are but a few, a very few, of the aquatic or semi-aquatic plants which form the treasure trove of the ditches and their immediate neighbourhood. A ditch is certainly a humble spot, but, as Wordsworth says,

"If rightly trained and bred,
Humanity is humble—finds no spot
Which her heaven-guided feet refuse to tread."

—o—

Two members of the Blackburn Field Club discovered in the spring a nice lot of the Toothwort in the neighbourhood of Downham. They succeeded in keeping it free from intrusion.

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The first number of the *Journal of Natural Science*, a new quarterly issued from Hull, contains a plan of the Port Erin Biological Station.

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The June number of the *Naturalist* contains a paper by J. W. Jackson, F.G.S., on "A New Species of Unio from the Yorkshire Estuarine Series."

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On May 14th the members of the Manchester Rambling Club again passed over the disputed footpath from Old Glossop over Doctor's Gate. The ramble was attended by a party of 100, who faced the formality of having their names taken by the keepers.

ZOOPHYTES:
THEIR LIFE HISTORY.

By Joseph Smith, M.R.I.A.,
Fellow of the Royal Society of Antiquaries, Ireland.

(Continued from page 54.).

A feature of development which is for the benefit and increase of the colony, is the propagation of the hydranth, and this feature is worthy of attention, if only on account of the economical interest it gives rise to, for in this development no demand is made on the generating elements, which are solely for the increase of the species. When this method of propagation is about to be consummated, the layers of the cœnosarc are observed to be pushed out in the form of a swelling, and a small hollow tube forces its way and pushes forward the perisarc, which is by the general advance of the embryonic tube stretched over the bud, until it finally becomes absorbed, or ruptured. Growth has, however, been continued, and the bud may soon be noticed covered with a thin pellicle or structureless skin.

Continuing to increase in size, the endodermic and ectodermic structures may now be distinctly made out, with the cavity opening fully into that of the branch from which it springs, and admitting into its interior the fluid with the floating granules, which fill the general cavity of the cœnosarc, and are kept in active rotation by the bud.

This bud continues to grow larger, and assumes a clavate form from the distal end, the perisarc covering it continues to thicken, not in the ordinary course, but by the addition of layers on the inner surface, and sloughs cease to be cast out from the free end of the bud. Eventually the pellicle covering the bud disappears, a terminal mouth located in the centre of the oral pole, which is somewhat enlarged and conical in shape, begins to develop, while at the apex of the cone immediately round the mouth is a circlet of small tentacles, a second row being formed at the base of the cone. The Hydranth steadily passes through the various phases, and assumes the adult form, eventually coming into direct contact with its watery home. A second method of sexual development, adopted by some of the Hydroids,

is by means of medusiform "persons," usually termed medusæ. These are parthogenetic, and alternative of generations, the medusa not being the true embryo, but the intervening stage which eventually gives rise to the generative buds, from which the species is finally produced. It is exceedingly difficult to follow the development of these medusoid forms, but they are found to consist of ectoderm and endoderm.

At first a slight hernia form originates. The cavity of the umbrella is still closed by the more external of the two laminæ, into which the ectoderm had originally split at the distal end. In the final stage the lamina is either perforated in the centre in order to form the velum, or what is more probable, entirely disappears and the manubrium becomes possessed of a mouth. The solitary tentacle has become elongated, and the umbrella with rapid convulsive contractions and expansions breaks away from the stolon. These medusæ can reproduce themselves by budding, but it has rarely been observed to undergo this phase simultaneously with the production of the ova or spermatozoa. Ultimately the elements of reproduction are developed in the neighbourhood of the manubrium, and the medusoid having fulfilled the purpose of its existence, swages away in consummating the liberation of the life-continuing elements.

Ocelli are small organs embedded in the base of the margin of the umbrella ; these vary in number, and are considered to be auditory sacs. The lithocyst which, like the ocellus, is invariably developed on the margin of the umbrella, is a transparent, mostly spherical capsule, within which are contained one or more transparent refractile concretions, generally of a spherical or oval form. By some naturalists, Agassiz, Hæckel, and Fr. Müller, it is supposed to be an organ adapted for the dual function of detecting sound and absorbing light, in other words to be an auditory and sight organ, but the visual function of this organ has not been supported by any naturalist so well as by Busk, who made some very elaborate dissections of the parts, for the purpose of proving that sight was its correct function. Although budding constitutes a highly characteristic and all but

universal phenomenon amongst the Hydroida, multiplication takes place by fission, but this feature is rare and exceptional. When propagation takes place by this process, the fission commences by a vertical split or division of the manubrium, and this phase in the process is followed by a division of the the umbrella, and so this multiplication continues until that medusa form which generates the ova or spermatozoa as the case may be is attained.

A marked and interesting instance of propagation of the Hydranth by fission, is that which has been observed in a Hydroid bearing great resemblance to *Obelia dichostoma*, and which has been named *Schizocladium ramosum*.

We have now taken a rapid survey of some of the characteristic features in the life history of the Hydroids, those reproducing the species by m ans of a ciliated planula as exemplified in the Eudendrium, and those which reproduce themselves by the peculiar sporosac, which may be termed a modified medusa, as seen in Dicoryne, and also by the medusa form proper illustrated in the Padocoryne. There still remains a third section, which forms a very interesting group. These are the Tubularians, and they propagate themselves by means of a peculiar shaped planoblast termed an actinula, or wandering medusoid, on account of the ambulatory powers which it is endowed with. The development of this actinula is peculiar. The granular plasm which in other Hydroids becomes differentiated into ova, is, in place of being so transformed, utilised in another manner. Portions become detached from the mass, and lie loose in the cavity of the gonophore, where they undergo development into free embryos.

Such are some of the features in the life cycle of this interesting group of animals, well worthy of consideration ; many and more wonderful are at the service of the patient observer who takes the trouble to look for them, while in the fulfilment of their social economy, we are introduced to problems

which might be adopted with advantage by those who regard these organisms as merely degenerate structures of little or no utility in the order of creation. Yet, what greater lesson in co-operation and good for the welfare of the community at large, may not be learned from the daily routine of life of these lowly polyps? Never, so to speak, idle, each one not only supports its own individual existence, but it also labours for the support and maintenance of the colony as a whole. Features of fresh interest present themselves to the microscopist, many individual life histories have to be worked out, and difficulties cleared up, while no dearth of material to work on exists. These organisms are found in plant-like tufts, sometimes spread over shell and stone like the finest lacework and fairy charms. At times they bury the seaweed beneath their fleshy crusts, or "invest it with a silvery network, while in others the colonies are built up of excellent little tubes gracefully curved and delicately tinted, forming the most varied and attractive combinations, so that if the ordinary seeker after knowledge would bring his mind to bear on the subject, he would find there is in the study of Hydroids as much variety and interest, as much amusement and perplexing difficulty, as much opportunity for observation and experiment, as much incitement to hunting and collecting, and exploring the nooks and corners of a rugged shore, and the recesses of the sea, as there is in any of the fashionable provinces of exertion," while it trains the mind to realise the working of a mighty influence and power, which co-ordinate laws to regulate the beautiful harmony of such wonderful progression the study of these lowly organisms reveals to us.

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OLD-WORLD COTTAGES IN SCORTON VILLAGE.—Nowadays the old thatched cottage is rapidly being superseded. There still exist, however, in the more rural portions of the county such quaint corners as that depicted in one of our illustrations. This we reproduce by the courtesy of the "Gazette" Press, Darwen. The photo. is by Mr. H. Cotton, Blackburn.

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A KEY TO THE BRITISH AGARICINEÆ.

By H. J. WHELDON.

(Continued from page 65.)

23 { *Fleshy*, 4-7cm.; stem *ventricose*, stout *H. ventricosus* B. & Br.
Fleshy, 3-7cm.; stem *attenuate below*, firm *H. virgineus* Fr.
Thinner, umbil., 2cm.; stem slender, *equal* *H. niveus* Fr.

24 { Yellow drying with a greenish tinge, 1-2.5 cm. diam. 25
Reddish-yellow, orange or buff, 3-7cm. diam. ... 26

25 { Umbilicate, striate. On chips... *H. Wynniæ* B. & Br.
Wrinkled even, not umbil., micaceous. *H. micaceus* B. & Br.

26 { Reddish-yellow, *fibrillose-floccose*, 5cm. *H. leporinus* Fr.
Pileus almost *glabrous*; stem narrowed below ... 27

27 { Stem *glabrous*, even, paler than pileus... *H. pratensis* Fr.
Stem *squamulose*, fibroso-striate, whitish *H. nemoreus* Fr.

28 { Sooty, 7-12cm.; gills *white then glaucous* *H. caprinus* Fr.
Umber, 2-3cm., *fœtid*, stem olive-yellow *H. fœtens* Phil.

29 { Pileus white, whitish, or livid-grey 30
Pileus brown, greyish brown, or blackening 34

30 { Gills broadly adnate, often toothed 31
Gills adnexed, with a tooth, or *almost free* 33

31 { White, stained brown, gills *very distant* *H. distans* Bk.
Livid-grey, umbonate *not umbilicate*, gills distant ... 32

32 { Fragile; margin even, spores 12 x 10... *H. Clarkii* W.G.S.
Moist; disc brownish; *margin striate*, sp. 7 x 4 *H. irrigatus* Fr.

33 { Rather wavy, *even*, 2-5cm., *stem equal tough* *H. fornicatus* Fr.
Wavy, striate, 4cm., stem attenuate, *fragile* *H. clivalis* Fr.

34 { Radiato-striate, disc brown, thin, 3-5cm.. *H. subradiatus* Fr.
Not striate, brownish, blackening, 3-5cm., smell mealy 35

35 { *Fragile, thin*, at first conical, stem equal ... *H. ovinus* Fr.
{ *Convex*, stem *attenuate*, reddish within *H. metapodius* Fr.

36 { Yellow or crimson, black when bruised or old. *H. conicus* Fr.
{ Olive-bay, black *when dry*, gills citrin *H. spadiceus* Fr.
{ Not becoming black 37

37 { Pileus brownish, smoky-brown, pale umber or sooty olive 38
{ Pileus tawny or pale brick-red. Gills decurrent ... 40
{ Pileus clear lemon-, wax-, or golden-yellow or green 41
{ Pileus crimson, vermilion, or scarlet 48
{ Pileus pale rose, conical, splitting **H. calyptræformis* Bk.

38 { Smell nitrous; greyish-brown, gills adnate *H. nitratus* Fr.
{ do. sooty-olive, gills glaucous *var. glauco-nitens* Fr.
{ Inodorous... 39

39 { Pale umber; gills *very decurrent* *H. Colemannianus* Blox.
{ Smoky-brown, very glutinous, gills adnate *H. unguinosus* Fr.

40 { Brick-red or tawny, stem dry, fragile ... *H. sciophanus* Fr.
{ Deep tawny, viscid; stem slimy, tough ...*H. laetus* Fr.

41 { Gills sub- or truly decurrent 42
{ Gills adnexed, or adnate becoming free 45

42 { Citrin, 1-2cm., edge striate, stem *solid* *H. citrinus* Rea
{ Stem stuffed or hollow 43

43 { Golden *but smoky-downy*, 1-2cm., stem tawny †*H. turundus* Fr.
{ Not broken into smoky-squamules 44

44 { Lemon-yellow drying whitish, edge *plicate* *H. vitellinus* Fr.
{ Wax-yellow, *faintly* striate, gills broad *H. ceraceus* Fr.

45 { Green-glutinous or yellow in parts, conical. *H. psittacinus* Fr.
{ Not covered with green gluten; stem apex not green 46

46 { Smell mealy; golden then greyish *H. intermedius* Pers.
{ Inodorous. Stem even 47

47 { Sulphur, 2-3cm., striate, stem round ...*H. chlorophanus* Fr.
{ Golden, 5-7cm., wavy, even, stem compressed *H. obrusseus* Fr.

* *var. niveus* Cke, entirely white.

† *var. mollis* B. & Br. golden, *fibrils same*, stem yellow.

48 { Gills decurrent, adnate, often with a decurrent tooth... 49
{ Gills adnexed 51

49 { Vermilion, 1-2cm., *umbo. acute*, gills triangular *H. mucronellus* Fr.
{ Crimson, not acutely umbonate, gills not decurrent ... 50

50 { 3cm., convex, glabrous; stem red, *base yellow* *H. coccineus* Fr.
{ 1-2cm., umbilicate, squamulose, stem *all red* *H. miniatus* Fr.

51 { 5-9cm., wavy; stem striate, red, *base white* *H. puniceus* Fr.
{ 2-3cm., thin; stem *even*, *all yellow*, equal *H. chlorophanus* Fr.

Hypholoma Fries.

GENERALLY CÆSPITOSE AND GROWING ON WOOD.

1 { Pileus smooth or naked, viscid or dry 2
{ Pileus with innate silky fibrils, streaked or floccose ... 15

2 { Pileus tough, dry, not hygrophanous, bright coloured 3
{ Pileus viscid or glutinous 7
{ Hygrophanous, often brittle; veil appendiculate ... 10

3 { Dark brown, radiately rugose, 2-4cm.....*H. instratum* Britz.
{ Pileus not radiately rugose, yellowish brown... ... 4

4 { Gills crowded, greyish-yellow, olive or greenish ... 5
{ Not crowded, grey-brown, pileus yellow, 3cm. *H. capnoides* Fr.

5 { 2-4cm., brick-red, gills green then olive, stem ferruginous ... ... *H. elæodes* Fr.
{ 4-7cm., yellowish, gills pale yellow or grey *H. epixanthum* Fr.
{ Tawny-red to yellow, gills sulphur, green or purplish 6

6 { Sulphur, mid. sienna, 3cm., stem *hollow*. *H. fasciculare* Fr.
{ Tawny-brick red. 4-9cm. plane, stem *stuffed* *H. sublateritium* Fr.

7 { Stem *bulbous*, solid, at least at the base 8
{ Stem equal, fistulose 9

8 { Glutinous, umber, *turbinate*, 2cm., *edge ragged* *H. œdipes* Cke.
Viscid, orange-rufous, convex, 7cm. ... *H. silaceum* Fr.

9 { Deep bay-brown to tawny, 6-9cm.; gills olive *clouded purple* ... *H. incomptum* Massee
Tawny to umber, 2cm., gills olive brown *H. dispersum* Fr.

10 { Solitary. Watery drying white, 3cm., gills *adnate with a tooth*, subdistant. *H. engenulum* B. & Br.
Cæspitose, bay to ochraceous ; gills crowded not toothed 11

11 { 3-6cm., bay drying whitish ; gills *violet* then brown; stem *fibrillose*. Fragile. *H. Candolleanum* Fr.
3-5cm., bay to ochre, gills exuding drops *H. hydrophilum* Fr.
Gills not violet at first nor exuding water 12

12 { Globose or hemisphærical then expanded 1.5-2cm. ... 13
Ovate or subcampanulate then expanded 4-7cm. ... 14

13 { Pale ochre ; gills adnate ; base floccose *H. catarium* Fr.
Fuscous-ochre; gills adnexed; annulate *H. pilulæforme* Fr.

14 { Whitish, gills whitish then *brownish* *H. appendiculatum* Fr.
Bay then whitish, gills *greyish-black* ... *H. leucotephrum* B.

15 { Pileus floccosely scaly or atomate, pallid ochre ... 16
Pileus innately fibrillose, silky or virgate 17

16 { Oval then expanded, rugulose, 2-5cm., greyish-ochre *H. cascum* Fr.
Convex, depressed, edge involute, 3cm.; gills sinuate adnate with a tooth. Densely tufted *H. punctulatum* Kal.
Conical, edge upturned, 3-5cm., base downy *H. lanaripes* Cke.

17 { Orange-tawny-squamulose, 5-9cm.; stem pale tawny 18
Umber then pale, innately black-pilose *H. melantinum* Fr.
Pale fuscous, brownish or livid... 19

18 { Stem fibrillose, 6-9cm., gills adnate ...*H. pyrotrichum* Fr.
Stem shaggy with whitish squamules ... *var. egregia* Mass.

19 { Pale tawny, flesh *thin*, *hygrophanous*, 5-9cm *H. velutinum* Fr.
Firmer, *fleshy*, *not* hygrophanous, 5-7cm.; gills brownish, edge whitish. Stem fibrillose or squamose 20

The Passing Hour.

The recent heavy storms had a very disastrous effect upon the fish in the Ribble Valley. A correspondent in the "Northern Daily Telegraph" says that the River Calder was the first to rise into flood, and an immense volume of its filthy water poured into the Ribble at Hacking Boat, just below Mytton. The junction of the rivers at that point is almost at right angles, and the Calder flood rushed right across the dead-low Ribble, leaving on the opposite bank a thick deposit of foul black mud, and then, swirling round, continued its course in the Ribble bed. In this deadly flood the fish below the confluence of Calder and Ribble were caught and poisoned, and as the river subsided it left stranded on the grassy banks and gravel beds many thousands of dead fish—trout, chub, loach, minnows, gudgeon, and dabs. The latter, which wander upwards from the estuary at Lytham, are occasionally caught with the rod and line in the Ribble about Ribchester. Two Blackburn gentlemen are said to have picked up in a few minutes fourteen fine trout on the banks near Hacking Boat, and according to the man in charge of the ferry boat at Hacking it is twenty years since there was such a wholesale destruction of fish.

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A further danger to which fish are now becoming liable is set forth in another Lancashire contemporary. It appears that the water draining off the tar-sprayed roads has found its way into streams frequented by fish, and has played sad havoc among them. Many have succumbed from this cause. Fish are not so plentiful, nor are the facilities for good fishing so universal, that conditions which may have a tendency to weaken the supply can be altogether ignored.

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There are, of course, many circumstances which it is not possible to control. Anglers, those of South Lancashire in particular, know the Preston to Kendal Canal very well. In summer some lengths of it can rarely be visited without seeing a few devotees of the rod, and many competitions are decided on its banks. It has never been of recent years equal to what it was formerly. The cause of this was a burst in the canal. This occurred some years ago close to Hest Bank. For a long time the meadows about were covered with the dead bodies of the fish.

OLD MANOR HOUSES.

On May 20th, under the leadership of Mr. John Cantrill, a large party of the Manchester Field Naturalists had a most interesting afternoon. Five old manor houses on the verge of Manchester were visited. These were Barlow Hall, Hough End Hall, Old Hall (or Chorlton's Farm), Birch Hall, and Platt Hall. Of each of these Mr. Cantrell gave short papers on the architecture of the buildings and of the inhabitants of both the present and older structures. At Platt Hall, where tea was taken, sketches were shown of the various places, and Mr. Cantrill added further remarks. The botanists had an unusually good day. At Birch Hall the garden has been practically given over to the wild flowers, and this feature was much appreciated. With others occur the enchanters' nightshade, bistort, wild garlic, wood millet grass, etc. The wild garlic is often used as a substitute for a similar flower in the making of wreaths, notwithstanding its strong odour when bruised, and in this guise often finds its way into the Manchester markets. Planted among these are tufts of Solomon's seal, rose-bay willow-herb, and soapwort. The chief feature at Barlow Hall was the smooth-leaved elm, and the garden at Hough End Hall possessed also some fine trees and shrubs—the false acacia, a weeping ash, a magnolia, the all-spice, and several kinds of azalea. The house front is adorned with several kinds of plants.

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The Manchester Law Clerks' Friendly Society had their annual ramble on May 20th, the route selected being the very popular one from Whaley Bridge to Buxton. By a special favour the party passed from the Chilworth powder mills to Goyt Bridge along the carriage drive to near Errwood Hall, and thence by the private road to "Goyt's Head," and this privilege was fully appreciated.

FIELD NATURALISTS AT MARPLE.

The Manchester Field Naturalists visited the Marple district on a recent date, under the leadership of Messrs. Branson and Scott. The latter gentleman described Marple Hall, where the celebrated John Bradshaw, of Commonwealth times, was born in 1602 and christened in Marple Church. He was sent to a school at Bunbury in Cheshire, and then to the Grammar School at Middleton, near Oldham, where he probably came in contact with Humphry Chetham. Bradshaw was articled to a solicitor in Congleton, and married Mary Marbury, a Cheshire lady. He was, along with Cromwell, buried in Westminster Abbey, but by order of King Charles II. their bodies were dug up and put on Tyburn gibbet, and their heads exposed on Westminster Hall. Bradshaw became friendly with Worsley, of Platt Hall, Birch of Birch, Rusholme, and other men of the district who took an active part in assisting the Commonwealth formed by Cromwell. The walk was then resumed by Dan Bank to the seventeen-windows house, close to Yew Tree Farm. From here the path through the farmyard and through fields, including parts of the golf links, on to Torkington Moat was then taken. This was one of the most delightful portions of the walk, leaving Marple Woods on the left, beyond which the distant eminences stood out in beautiful relief. At the Moat Mr. James E. M'Donald gave an address on its probable origin and other features of the district. The description ended, refreshments were partaken of at the Broad Oak Farm, at the kind invitation of the leaders, and a pleasant walk through field paths and country lanes to Hazel Grove brought an interesting ramble to a close.

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At the Royal Institution on May 20th, Mr. W. P. Pycraft delivered an interesting lecture on "Phases of Bird Life." Mr. Pycraft traced the development of the bird's wing, and discussed the origin of the wing both in the bird and the bat.

LIVERPOOL BOTANICAL SOCIETY.

The June meeting of the Society was held at the Hartley Botanical Laboratory, Liverpool University, Dr. J. W. Ellis, F.E.S., occupying the chair. The members' exhibits, which were numerous and varied, formed an important and interesting feature of the evening. A report of the Frodsham excursion was received from Mr. J. A. Wheldon, F.L.S., together with a short note on the discovery of *Swartzia inclinata* on the sand-dunes at Freshfield. This rare moss is an integer of the sand-dune moss association of several other districts, such as the Sands of Barrie. It was expected, therefore, to occur on our Lancashire coast, but so far as can be ascertained this appears to be the first note of its occurrence here, although it has been found at Rainford by Messrs. Travis and Wheldon.

Mr. W. G. Travis announced the discovery, and exhibited specimens, of *Cololejeunea calcarea* found at Pendle Hill, this being the first record of its occurrence in South Lancashire.

Interesting flowering plants were distributed and commented on by Messrs. A. A. Dallman and H. J. Wheldon. Some sketches of Wirral Pyrenomycetes and Agarics were passed round for inspection by Dr. J. W. Ellis, amongst them being *Collybia tenacella* Pers., *Sordaria coprophila*, and *Sporormia intermedia*.

Mr. H. J. Wheldon recorded several West Lancashire *Uredineæ* received from Mr. J. W. Hartley, of Carnforth, and exhibited drawings of *Cæoma orchidis* (on *Orchis incarnata* and *Listera ovata*), *Puccinia taraxaci*, *Phragmidium subcorticium* on *Rosa*, and *Ustilago perennens* Rostr. on *Arrhenatherum elatius*.

A paper on the "Etymology of Plant Names" was read by Mr. W. A. Halfpenny, in which he carefully and concisely traced the derivations of common English plant names. Dr. W. A. Lee, M.A.) in proposing a vote of thanks to the lecturer, made interesting comments on the subject, as also did Mr. A. A. Dallman and Dr. J. W. Ellis.

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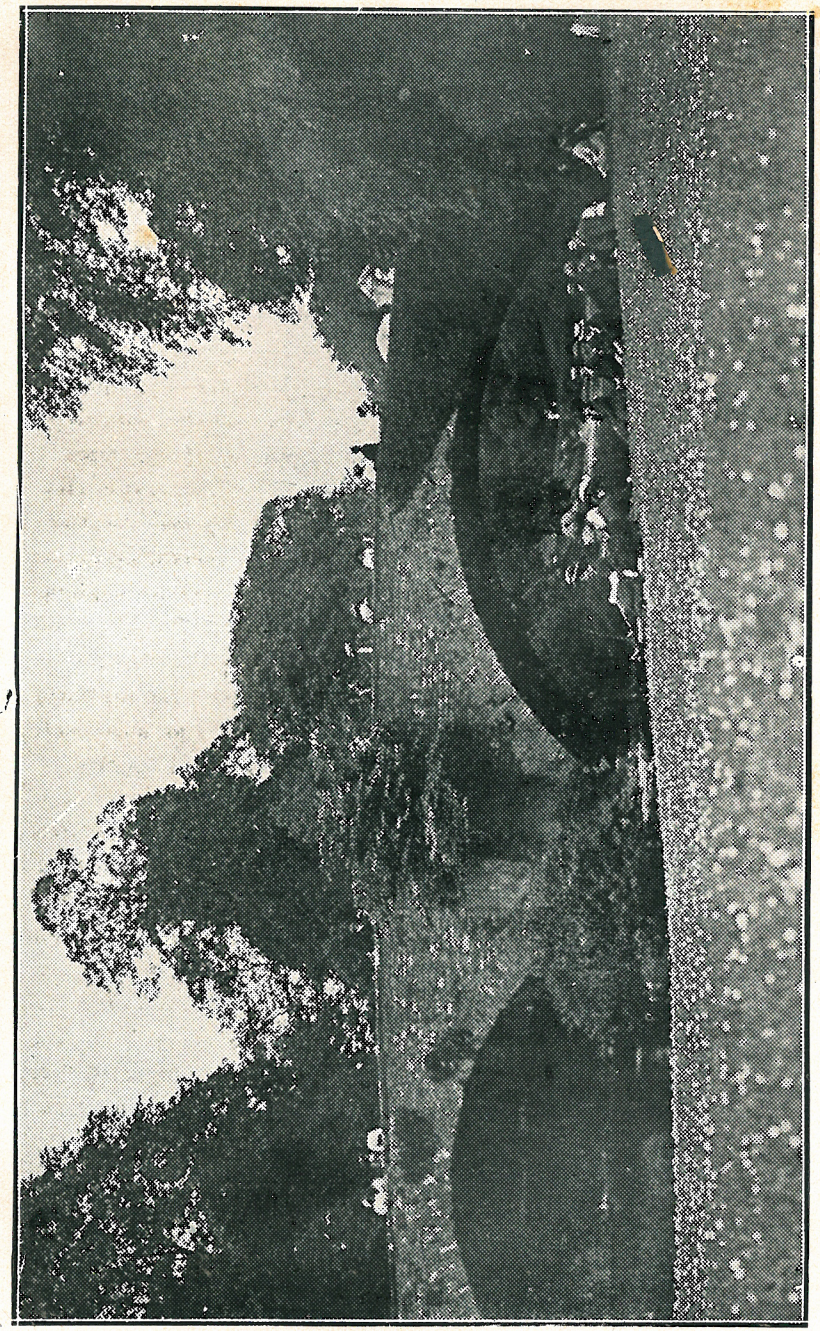

A PRETTY BRIDGE NEAR LEVENS.

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Wayside Leaves.

Early in June the botanists of the Manchester Municipal School of Technology paid a visit to Sale Park and Stansfield's fern nursery, Broad Road, Mr. H. Hyde being in charge. The park came in for a great amount of attention, the trees and shrubs and the small flowering plants delighting the students. The wonderful collection of British ferns at the nursery, which includes many extreme and remarkable varieties, fascinated the students, who were conducted by Mr. Stansfield round the nursery, and introduced to many interesting phases of fern life. Some of the varieties examined showed a tendency to revert to the original form, but most of them were undoubtedly "fixed" and far removed from the ancestral type. Apparently the two species mostly given to variation are the Lady Fern (*Athyrium Felix-fœmina*) and the Hart's-tongue (*Scolopendrium vulgare*). In addition to the ferns some of the flowering plants received appreciation as well, and also the grafting on the fruit trees.

Close to Carrington Moss, lies what is known as the Ballast Hole, a large tract ten or twelve acres in extent of boggy and swampy land. When the West Timperley railway was made close upon a half century ago, large quantities of clinkers, refuse, and ballast were deposited upon the land to give it firmness and solidity, and thus it acquired its name. On one side of the railway line the land is uncultivated and still in its primitive condition. There are several large ponds filled with aquatic plants, and surrounded with sedges, grasses, the yellow iris, and other marsh plants. The ponds are almost hidden from view by shrubs and trees, comprising the alder, oak, birch, willow, guelder rose, rowan, elder, and brambles, the honeysuckle also flourishing. Under the trees shade and moisture loving plants grow luxuriantly—ferns, sundew, orchids, cotton-grass, marsh pennywort, skullcap, valerian, ragged robin.

Such were the plants found on a visit by the Botany Class connected with the Manchester School of Technology. Owing to the drought some parts of the bog could be traversed without difficulty.

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On July 1st a visit was paid to Woodheys Hall, Ashton-on-Mersey, the seat of Mr. R. P. Gill. The grounds were well-kept and in splendid condition. Mr. H. Hyde and the head gardener, Mr. Woollard, accompanied the party round.

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We are sorry to hear that Mr. Fred Taylor has been laid up with a damaged kneecap, and that he will probably be disabled for the season. Mr. Taylor was on a naturalist excursion in the Chatburn district when the accident occurred. He saw a lapwing rise, and went to look for its nest in the middle of a field almost a quarter of a mile from the main road, and did not notice a herd of cattle in the field until he found himself being charged by a roaring bull. He took to his heels, and in making an extra spurt wrenched his kneecap. He was laid there for for about two hours, with a roaring, stamping bull around him, not knowing what turn the beast would take. He managed to attract the attention of three lads, who came to the edge of the field, but after shouting out his peril to them they moved off. Help came at last. A lady and a girl espied him, and as the lady was looking over the wall the bull made for her and left him. Having managed to convey to her the predicament he was in, assistance was obtained from the farmer, and eventually they got him bandaged up and off to Manchester, and from thence home.

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The Manchester Field Naturalists visited Daisy Nook and Crime Lake on June 21st, noting by the way Clayton Hall, Medlock Hall, etc.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Cololejeunea calcarea (Lib.) in South Lancashire.

I was fortunate enough to find this rare hepatic during a visit to Pendle Hill, at Whitsuntide, and it constitutes a very acceptable addition to the hepatic flora of South Lancashire. It occurs on damp, shaded, calcareous rocks in a gully on the lower northern slopes of Pendle Hill, at an elevation of about 700 feet, the rock being a dark, slightly shaly limestone of the Pendleside Series. The plant occurs sparingly in several places in the same gully, but in one place it grows abundantly on the under side of a projecting rock, near a little waterfall, the bare surface of the rock being nearly entirely covered with it. It was in fine condition and fruiting. Growing near it on moss was another hepatic, namely *Lejeunea cavifolia*, a very rare species in South Lancashire, which is only known to me to occur in one other locality in the vice-county (see the *L.N.* No. 16, July, 1909).

Cololejeunea calcarea is recorded from a single locality in West Lancashire. According to the *Flora of West Lancashire*, it occurs in Middle Ease Gill, on shaded limestone scars, associated with *Metzgeria pubescens*. I may add that I have also found it, in the same neighbourhood, on the walls of a pot-hole on Leck Fell, in June, 1908.

C. calcarea is frequently found in company with its congener, *C. Rossettiana*. which it greatly resembles, but so far as I have examined my gathering, I have not yet detected the latter species.

These two hepatics are among the most beautiful of our Lejeuneæ, and are readily distinguishable from all other British Lejeunias by the leaves being echinate, the surface cells of the leaves projecting like minute spines.

W. G. Travis.

A PLEASANT DAY AT HURSTWOOD.

On the 15th of July the members of the Blackburn Field Club visited Hurstwood, having as leader Mr. J. D. Baxter, whose literary and historical work is well-known. The journey from Bank Top Station, Burnley, until reaching Brunshaw Lane was dismal enough. Onward to Hurstwood the way improved every step, and when the "Long Causeway" was left—a remnant of one of the oldest ways in the country—and took to the fields the last portion was delightful. Hurstwood's four or five houses are much the same now as they have been for the past three hundred years. Such an out of the way and interesting little hamlet there is not perhaps in all Lancashire. A visit, however, is needed to feel the charm and restfulness of the place. Edmund Spenser's connection with Hurstwood is well told in Mr. Baxter's historical introduction to his delightful students' play, "The Witch of Pendle." Spenser's father had migrated to London from the neighbourhood of Burnley, and in London Edmund Spenser was born, probably in 1552. It is thought that about 1576-7 he visited his relations, who lived at Hurstwood. Here, or in the neighbourhood, he fell in love with the "widowes daughter of the glenne," whom he calls his Rosalind. The poet was jilted, and "his layes laughed to scorne," in favour of a Pendle yeoman, whom he names Menalcas. These names, it is stated, are anagrams. Fleay, the noted Shakesperian scholar, first suggested Rose Dyneley as the solution of "Rosalind," locating her in Worcestershire. Dr. Grosart also thinks that Rosalind signifies Rose Dyneley, the daughter of a yeoman—perhaps of Downham, near Clitheroe, or of one of the many quaint halls that still dot the sides of Pendle Hill. Menalcas, Dr. Grosart identifies as Asmenall—a well-known local family—the name now being written Aspinall. The Asmenalls lived at Pendleton, Standen, and Clitheroe. The authors of the "Memories of Hurstwood" fix the original seat of the Dyneley family at Dyneley Hill near Towneley; there were, however, Dyneleys living in other parts

of the Pendle district, especially in and around Downham. Many Spensers lived around Pendle. There were Spensers of Filley Close in Pendle Forest, not far from Burnley, and Spensers at Clitheroe, Extwistle, Hurstwood, Briercliffe, Ightenhill Park, The Ridge (a farm belonging to Burnley Grammar School), and Marsden — all spelling the name "Spenser" instead of "Spencer." This peculiarity belongs, it is said, to this corner of Lancashire A "Lawrence Spenser" is recorded as wedding a "Lettice Nowell." The names Edmund and Lawrence occur over and over again in registers and family records. The poet had a son named Lawrence; it has been suggested also that Lawrence Spenser, buried at Newchurch-in-Pendle in 1584, may have been the poet's grandfather.

"Memories of Hurstwood" describes the three old houses of the hamlet thus: "The principal house is Hurstwood Hall, a building in the early Jacobean style of architecture, built by Barnard Towneley in the year 1579. Spenser's House stands hard by Hurstwood Hall. It is built in a very substantial manner almost entirely of millstone grit, with a quaint, square porch. Entering the house, the first room to the left is a small chamber with a massive stone fireplace, and oaken roof. In this chamber was formerly a curious carved panel, now preserved at Ormerod House, containing the arms of Spenser de Hurstwood, differing only from the arms of Thomas le Despencer, Earl of Gloucester, by the addition of three fleur-de-lys. At the extreme end of Hurstwood stands 'Tattersall's Homestead'—a long, low building, composed of massive blocks of millstone grit. From the style of the building, it appears to be of the same age as Spenser's House, and both are, no doubt, older than Hurstwood Hall." P. G. Hamerton, poet, artist, and critic, illustrates his "Dream of Nature" with a view of Spenser's House.

The latter part of the way the party descanted on flowers. Spenser was so fond of flowers he is never long before he is chanting their praises The "Shepherd's Calendar"—supposed

to have been written in "Spenser's House"—contains many stanzas on flowers only, and full of that delicious melody so dear to the Spenser-lover.

The latter part of the afternoon was spent at Towneley—an ideal Tudor mansion of the usual shape, and containing much valuable and interesting oaken carving. The homesteads at Hurstwood were the homes of Tudor yeomen; the great manor house of Towneley tells how the Tudor noble lived. The building is now the "treasure-house" of Burnley. After a couple of hours examining paintings, curios, etc., they made for the station.

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MINE SHAFT SIGNALLING.

An improved apparatus for mine shaft signalling was recently described by Mr. J. C. Edie at a meeting of the Manchester Geological and Mining Society. A working model, which was exhibited and put into operation, showed how by means of a luminous electric arrangement visual signalling may be employed with the bells. It was pointed out that the appliance was the only combination of bells and electricity which gave confirmatory visual signals, and at the same time complied fully with the regulations of the Home Office. It had stood the test of over two years' working at a Durham mine and gave complete satisfaction, the object being to provide a safe and rapid means of communicating orders from the different levels to the engine-house. An advantage of the appliance was that it could be used in conjunction with any existing bell system, and greatly assisted in confirming orders, and generally tended to reduce the possibility of mistakes by enginemen in receiving orders.

The President remarked that they were only at the beginning of things in regard to shaft signalling, and expressed the opinion that there would be a considerable extension of this class of signalling in the future.

ITEMS OF INTEREST.

Blackburn Field Club at Tarleton.

F C. writes:—"A Mr. Ormerod used to buy powder from the Lowood Powder Mills, which was shipped at Ulverston to Freckleton Pool. It was then handed to a boat contractor named Rd. Iddon, who brought it down the mouth of the Douglas to Tarleton, where the Leeds and Liverpool Canal joins, and from there to their magazine at Gathurst, near Wigan." [This shows what the landing stage was partly used for, but does not explain the presence of the railway line.]

A Plague of Wasps.

Vespa sylvestris bids fair to overrun West Lancashire this season. Scarcely a bank but has its complement of wasp nests, and in an endeavour to mitigate the plague of these insects which must follow, the residents are carrying on a relentless warfare. All sorts of devices are being resorted to. They are being smoked out, burned out, and chemicals of all sorts are being tried. In spite of this some nests are strong enough to resist all attempts at destruction. J.C.

Antiquaries at the Old Parsonage.

The members of the Lancashire and Cheshire Antiquarian Society were on Wednesday, June 14th, invited by their President, Alderman Fletcher Moss, J.P., to the Old Parsonage, where a garden party was also attended by the Lord Mayor of Manchester and the Lady Mayoress, and some members of the City Council. The old-fashioned English gardens, and the old place itself, with its choice treasures, were greatly admired by the visitors.

LIVERPOOL BOTANICAL SOCIETY.

During the summer months the exhibition and distribution of fresh plants of special interest, forms an important feature of the Society's meetings, and in this respect the July meeting, held at the Hartley Botanical Laboratory, Liverpool University, was as successful as in previous years.

A garden-grown specimen of *Medicago maculata* was exhibited and commented on by Mr. Sibbald, and Mr. H. J. Wheldon passed round a coloured sketch of *Limonium vulgare*, which was infested with the æcidiospores of *Uromyces limonii*. The specimens were collected at Knott End, near Fleetwood, in crevices of the stone embankment. Mr. Wheldon also distributed *Saponaria officinalis*, the anthers of which were smutted with *Ustilago violacea*. Mr. A. A. Dallman and Dr. Ellis both stated that they had found this fungus frequently on the white campion, but less commonly on the red campion.

The usual box of acceptable flowering plants for distribution was received from Sussex from Miss Bray, a corresponding member, and the Chairman, Dr. Ellis, placed on view some plants collected at Raby, Durham, some of which were the hosts of the respective clustercups of various *Uredineæ* peculiar to the species exhibited. The Rev. W. W. Mason recorded *Tolypella glomerata* from pools near Leasowe, and distributed dried specimens of *Astragalus danicus* and *Hippocrepis comosa* from Lincolnshire. The paper on "Pigmentation of Bacteria" was then read by Dr. Harris, who illustrated his remarks by slides from micro-photographs of various types of Bacteria. A number of test tubes containing bacteria cultures were also on view, and these showed the pretty and striking variations in the pigmentation of different species. Dr. Harris gave in detail the conditions necessary to produce pigmentation in various cultures. He also mentioned the conditions which inhibit the appearance of pigments.

A vote of thanks was proposed by the Vice-president, Dr. Ellis, seconded by Mr. Sibbald, who raised some discussion on the phenomenal "blue-milk" caused by certain bacteria.

REFERENCE LIBRARY, SALFORD, PEEL PARK.

Work and Workers.

The Vice-Chancellor (Sir Alfred Hopkinson) of the Manchester University, on July 8th, said that at a somewhat later date this year they hoped to see the completion of the extension of the Museum, which had been made possible by the generosity of Mr Jesse Haworth. Their magnificent Egyptian collection, which it was not easy for the public to see, would be properly housed, and there would also be some extension of the geological museum, especially in the mineralogy and mining departments. That building would be the type and sign of what could be done, at very moderate cost indeed, by a University working for the public good and on lines which were not merely beneficial to the members of the University, but to the whole of the community who cared for natural history or for historical investigation into the ancient world. He was glad to think that the city and the University were at one on that matter.

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Referring to the new botanical laboratory, he considered Professor Weiss, Professor Lamb, and those who worked with them would now have a proper home in which to carry on their work. It was very fortunate that that happened at the same time that the Board of Agriculture had, by a substantial grant, recognised the work that was being done at the University which bore upon agriculture. He hoped that work would soon very largely develop, and that they would see students coming from different parts of the country for the study of that subject. The extension of the physical laboratory would enable them to concentrate the work which was now being done by Dr. Beattie. Another lecture-room which was sorely needed would be available, and the rooms which would be vacated would be used for those invaluable researches which were being prosecuted by Professor Rutherford and his staff, and by students coming from all parts of the world to pursue research there.

While spending my Whitsuntide holidays in North Wales, I came across an exceedingly fine specimen of *Larix europœa*, growing near a farm about a mile from the village of Llanelian, near Old Colwyn. The girth of the tree at the height of a yard from the ground was 14 feet 3 inches. The tree did not grow in the ordinary normal way of the larch, but sent out one or two fine horizontal branches at about three and a half yards from the base. But the striking feature lies here : At a height of 7 yards, a small holly (*Ilex aquifolium*) about 15 inches high and in splendid condition, was growing from a slight depression near the junction of one of the branches and the trunk.

J. W. KENT.

On June 10th the Bolton Field Naturalists' Society visited Whitestock Hall, Rusland, the residence of Captain B. Palin Dobson, president of the Society. The party detrained at the pretty little station of Greenodd, where they were met by Captain Dobson and conducted to the hall. Under the President's leadership and that of the Vicar of Rusland (the Rev. I. M. Collinson), the several interesting places in the neighbourhood were visited. Tea was partaken of at Rusland School, and then the party drove along the avenue known as Rusland Beeches, through Abbotts Rhydding to Haverthwaite Station.

Mr. S. H. Leigh treats in *The Entomologist* on "A Biological Enquiry into the Nature of Melanism in *Amphidasys betularia*." Mr. Leigh has been studying this point for some time now, and has spent many days at Arnside and the district in observation. His chief examples are derived from this neighbourhood, and he points out that at Silverdale and Grange the *doubledayaria* (black) form occurs where it was once rare or absent. The contention that smoke is accountable for this form seems erroneous in this case, since the vegetation is absolutely undefiled and the atmosphere free from smoke.

MANCHESTER FIELD NATURALISTS.

The Manchester Field Naturalists occupied Whitsuntide in a pilgrimage to Canterbury. They left Manchester on Whit-Wednesday, and on arrival at Charing Cross, London, took train to Gravesend. A drive was taken from here to Rochester, and apart from the interest excited by the beautiful scenes, the places made sacred by Dickens were visited and appreciated. A halt was called at the Leather Bottle in Cobham, the drive being afterwards continued through Cobham Park. Cobham Hall, the seat of Lord Darnley, possesses a splendid avenue of lime trees, in four rows, two on each side of the roadway. This avenue is of great length. Gads Hill was visited, where so many happy hours were spent by Dickens, and the descent into Rochester, with its fine vistas, was much enjoyed, in spite of the inconvenience of constant dismounting. In Rochester the places more directly associated with the great novelist were seen, with the Cathedral and the Castle. Dover, Folkestone, and Canterbury were all fully appreciated.

The botanical side of the outing presented many delightful features. The most striking of the many lovely colour patches was afforded by the red spur valerian, which appeared for miles along the railway on the chalk banks of the North Downs about Dartford. Sainfoin was conspicuous, but was simply overwhelmed by the crimson clover, which presented brilliant scenes in a few places. The wild clematis (traveller's joy) was conspicuous on the hedgerows, with maple and the wayfaring tree, and the orchards and hop gardens were very interesting. The bottom of the deep fosse round Dover Castle is completely filled with that large umbelliferous plant known as Alexanders. On the Folkestone cliffs the botanist finds a wealth of things. The field mallow, the slender-flowered thistle (*Carduus tenuiflorus*), whitlow pepper-wort (*Lepidium Draba*), these are all conspicuous, with *Sinapis nigra*, the mustard from the seeds of which the condiment is manufactured. Clumps of Viper's Bugloss (*Echium vulgare*) were in bloom, and a wide range of plants included the trailing convolvulus, sea pink, buck's-horn

plantain, spotted medick in fruit, creeping rest-harrow, ox-tongue, wild mignonette, white stonecrop, with other absorbing species. Near the base of the cliffs the tamarisk flourishes. The Warren, lying on the Dover side of Folkestone, is the locality providing the richest work for the botanist, and here, were found such diverse plants as wild thyme, salad burnet, common rock rose, pink and blue milkwort, the gladdon, ladies' bedstraw, wood spurge, wild marjoram, kidney vetch.

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On July 1st Holmes Chapel and vicinity was visited, under the leadership of Mr. J. B. Milner, assisted by Mr. R. Ashworth, a local resident. This was a delightful contrast, the whole route being pursued by field paths, at intervals entering the cool shade of clumps of forest trees, and at times descending the steep banks of the river. Some interesting plants were noticed. *Cicuta virosa* (the water hemlock or cowbane) was seen in a pond near the Agricultural College, and the true hemlock was discovered about a farm on the return journey from Swettenham. The field mallow, pellitory, greater celandine, and black horehound were seen near many of the old cottages and farms. Characteristic plants were seen in marsh and on hedgebank, in the woods and in the fields. Some fine old oaks were seen, and the oak galls excited interest.

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On July 5th over one hundred members of the society were entertained at a garden party by Mr. and Mrs. James Lowe at their residence, Addison Grange, Sale.

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An evening meeting of the Liverpool Botanical Society will be held on the sandhills on July 31st, Mr. J. A. Wheldon, F.L.S., being leader.

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The *Nature Photographer* for July contains "The Equipment of the Bird Photographer," by Oliver G. Pike, F.R.P.S., F.Z.S.; "Merlin Watching o'er her Young," by Charles Kirk; "An Enlarging Dodge," by the Rev. S. N. Sedgwick, M.A.; "Fungi-Photography for Beginners," by the Editor.

COAST EROSION.

In the recently issued report on coast erosion, it is stated that along the Ribble estuary it is estimated that since 1839 some 5,000 acres to the north-east of Southport have been grassed over. The accretion of Southport is notorious. Between the Ribble and Fleetwood there is much erosion. Blackpool has checked the waste by constructing three miles of sea-walls, which, with parades, have cost nearly £500,000; but the effect is said to have been damaging to the coast northwards, at Bispham, where 70 feet are said to have been eroded in 17 years. A contributory cause was the removal of materials from the beach between Blackpool and Fleetwood, but this was prohibited by an Order of the Board of Trade in 1905. Towards Fleetwood the erosion has been slight since 1876, when the Fleetwood Estate Company put down groynes. But between 1844 and 1876 it is estimated that 23½ acres were lost by the company, and 6¾ acres by the Possall Beach Estate. The rise and fall of the tide is exceptional at this point, owing to water from north and south meeting here, so that a difference of 30 feet is sometimes recorded. Just beyond Fleetwood, the marshes at Pilling and Cockerham are said to have risen 4ft. in places in the last 40 years, but Sunderland Point is being eroded. Within Morecambe Bay there is general accretion, except at places like Silverdale, which are slightly eroded by alterations in the channels. "Hundreds of acres have been reclaimed between Grange and Arnside and at Holker," but, though cheaply effected, they are said to be of little use, being composed wholly of sand, with no warp or mud. On Walney Island there is erosion on the west at the rate of 3ft. per annum, but the southern point is growing at the rate of 9ft. per annum, partly due to accumulation of slag, which has travelled along the beach from Workington.

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A pike weighing 19¾lb. has been taken at Glasson Dock, by a Bradford angler. Pike have not hitherto been looked for in these tidal waters.

The Passing Hour.

W. Mason, of the Fox Tavern Angling Society, Stalybridge, is credited with having taken from a reservoir an English carp weighing 3lbs. 8oz. 9½dwt.

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The Lancaster Astronomical and Scientific Society held their annual excursion on July 5th, when a party of 42, including Dr. Coupland, the president, and Dr. Bibson, the hon. secretary, visited Stonyhurst. Train was taken to Preston, and from here a drive to this famous seminary was accomplished. At the college the party was shown over the library, museum, and the observatory. After tea at Hurst Green some of the party took the longer drive back by Mytton and Whalley, to rejoin the train at Preston.

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On the 1st of July 293 members of the Preston Centre Northern Anglers' Association took part in the eleventh annual contest for the silver challenge cup and £11 worth of other prizes. This is the largest number that has ever entered for this or any other contest organised in Preston. Only 55 men succeeded in bringing fish to the net, and amongst them they caught 43 eels, 32 perch, and one small jack. The conditions were to fish two hours; one rod and not more than two hooks; bait worm only.

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On a ramble to Styal and Lindow Common the Manchester Field Naturalists met with a few floral rareties. One was a healthy young specimen of the Royal Fern in one of the wet places, which originated probably from one of the cottage gardens.

LIVERPOOL GEOLOGICAL SOCIETY.

The last two field meetings of this Society have been devoted to the examination of Triassic rocks in two widely separated areas.

The first meeting was held at Runcorn on 10th June, under the leadership of Mr. F. T. Maidwell. Sections of the Upper Bunter sub-division, covered with boulder-clay, were first examined in Holloway, and from there the party ascended Beacon Hill, from which position the leader pointed out the principal topographical and geological features of the surrounding country. Passing along the western side of the hill through the old quarries in the Keuper Basement beds, two interesting exposures of the "Footprint bed" were observed. The sandstone and marl, having been removed from below, it was possible to observe on the overhanging surface the Cheirotheroid prints, suncracks, and other markings *in situ*.

The junction of the Lower Keuper and Upper Bunter was well shown in an old shaft, and in Guest's quarry the full thickness of the Keuper Basement beds up to and including a great part of the Frodsham beds, was seen. Later in the afternoon the fault in the railway cutting, throwing the Waterstones against the Frodsham beds, was inspected, and a visit was paid to the Free Library to examine the slabs there which show numerous Rhynchosauroid prints (some with traces of webbing). Several specimens of footprints were collected by the members during the excursion.

Despite unfavourable weather conditions on the 1st July a party of members paid a visit to the exposures of Triassic strata in the Cannock Chase district of Staffordshire. Travelling to Milford, near Stafford, they inspected the sections of the Bunter conglomerate beds exposed in several gravel pits where the character of the beds presents such a marked contrast to that of beds of corresponding age in the Liverpool area. The beds

consist for the most part of well-rounded pebbles of various sizes up to nine inches in diameter, lying almost loose in a slight matrix of sand with occasional patches of soft sandstone. The pebbles are mostly of quartzite, mixed with a smaller number of other rocks, including some containing Silurian pebbles. An interesting feature presented by a considerable proportion of the pebbles is the pits or cup-like depressions in their outer faces where the rounded surfaces of the stones are in contact. The pitting has been explained by some observers as resulting from the grinding of one surface on another during earth movements, but a more probable explanation is to be found in the solvent action of percolating waters which are retained at the opposing surfaces by capillary attraction. The President (Mr. W. Hewitt, B.Sc.) A.R.C.S., acted as leader on this occasion.

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Alderman J.W. Bentley, the oldest member of the Middleton Town Council, has had the honour of a portrait and sketch in the *Gardener's Magazine*. He is a successful grower of tulips and auriculas. The auricula became a speciality of his as long ago as 1877, but he did not interest himself in tulips until 1889, since when he has been a constant exhibitor. He has written a series of articles and a catalogue of tulips. He has been hon. secretary of the Northern Branch of the Tulip Society since 1893, of the Northern Auricula Society from 1897 to last year, and was for many years President of the Northern Carnation Society.

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"A Nook in Galloway," by Thomas Newbigging. (2s. net. Gatehouse-of-Fleet, N.B.: J. R. & A. Kirkpatrick).—Mr. Newbigging's delightful and gossipy notes upon a charming district we have already referred to. Their appearance in book form is greatly enhanced by the compact size of the volume and by the many piquant little sketches with which the work is illustrated. It is ranked with the best of the literature which has found in Galloway a congenial theme.

MANCHESTER MICROSCOPICAL SOCIETY.

At the closing meeting of the Mounting Section of the Manchester Microscopical Society for the winter session, the question was considered as to whether the exhibitions of the Society could not be arranged on more systematic lines, and as a result of the discussion and an interchange of ideas the October exhibition at the Athenæum may be looked forward to with unusual interest. On the card for the evening the Secretary had announced "Model Exhibition," and in response to a general invitation to bring instruments and give a little exhibit of their own, Mr. Abel P. Bradshaw provided a unique feature. He selected the "Life History of a Fern" as an exhibit, and at the rooms got half-a-dozen instruments out, and arranged them round one end of the table. Under each one of them some portion of the structure of a fern was exhibited. The little exhibit received so much attention from the members that the Chairman asked for a brief description to be given of it. Mr Bradshaw commenced with taking his place at the end of the table with the Swift Challenge Binocular, under which instrument he had placed a portion of the frond of *Aspidium Filix-mas*, showing the sporangia with the burst indusium, and some of the scattered spores on the portion of the frond. The relation of a flowering plant and one of the cryptogams was explained to an imaginary audience, pointing out the different methods of reproducing species—one by seeds and the other by spores, pushing the lesson home by exhibiting possibly a living frond of one of the ferns. He then proceeded to the next instrument, under which he had mounted a young prothalli of the same species, showing the antheridium and the archegonium with the rhizoids or root hairs attached. These were explained and compared with the stamens and pistils of the flowering plant, and then the third instrument was taken charge of, a Swift Monocular with a ¼ objective, under which he had a section of a prothalli cut 1-4000 of an inch in thickness, which showed beautifully the neck of the archegonium and the central

canal, and in one of them the first stages of the division of the germinal vesicle. This was followed by another slide showing a young prothallium with the first two minute fronds and the young rhizome emerging from it. The same species being still used. By this means had been followed out the development from the sporophyte to the sexual process, and it was explained what was meant by an alternation of generations. This he contended might have sufficed, but he felt inclined to just go a little further. Under two other instruments he had placed, using 1in. and ½in. objectives, transverse and longitudinal sections of the rhizome and rachis of the same species, showing the fibro-vascular bundles, and eventually finishing up by exhibiting a "coal ball" as found *in situ*; then a slide with a portion of it unfinished as a mounted object. Under the last instrument a portion of a *Rachiopteris Oldhamii*, showing the same form of scatanform vessels, and the various arrangements of the f.v.b. system; and then compared them with the living forms of to-day, pointing out to his supposed audience the relation of present-day forms with the great coal-bearing plants of the past. The short time allotted Mr. Bradshaw had not fully expired, and yet he was informed that he had accomplished what would have taken 1½ hours to explain in a lecture. He contended that he could have taken half-a-dozen people and kept them occupied—with another member assisting him so as to enable them to view the slides—and that he could have conveyed in language none too technical a clear and intelligent acquaintance with one of the commonest plants of our woods and banks. If only each member followed on similar lines, then the exhibitions would have not only a more intrinsic value from a scientific standpoint, but also that it would leave a more lasting impression on the visitors, and tend to increase the interest in the meetings and exhibitions.

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The new botanical laboratory at the Manchester University will be ready for work at the beginning of the next session.

MANCHESTER UNIVERSITY.

No more pleasing distinction could have been conferred upon any of our Lancashire naturalists than that of Master of Science which was granted to Mr. W. H. Pearson on July 8th in connection with the Manchester University. Professor Hickson, in presenting him for the degree, said a busy man living in a hive of industry, might yet find time, if he were gifted with the virtues of patience and scientific insight, to add materially to the sum of human knowledge. The University had already on more than one occasion recognised the value and importance of scientific or artistic work that had been done by distinguished citizens of Manchester in the intervals of their business life. In the person of Mr. W. H. Pearson he had the honour to present one who, though engaged in the industry of that city, had, by inexhaustible patience, by exemplary method and minute research, made his name famous in the field of cryptogamic botany. To bring the species of plants with which he dealt into a systematic order, to recognise the new species, and to describe the old with accuracy and precision, was a task that required no ordinary powers of observation and patient industry. But when it had been accomplished, a service had been rendered to scientific botany which fully merited their highest admiration and most sincere gratitude.

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The honorary degree of Doctor of Science was conferred upon Professor Theodore William Richards, of Harvard University, at the recent gathering at Whitworth Hall. Prof. Hickson, in presenting Prof. Richards, said the University of Manchester having its seat in the city of John Dalton—a city that could claim to be the birthplace of the chemical atom—welcomed the man who, with infinite patience and marvellous mechanical skill, had purified and weighed the atoms that Dalton conceived.

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The following appointments have been made at the Manchester University:—Mr. D. Thoday, M.A. (Cambridge), lecturer in Vegetable Physiology and demonstrator in Botany; M. L. Lailovoix, assistant lecturer in French; Mr. Charles Roberts, lecturer in Orthopædic Surgery; Mr. P. R. Wrigley and Mr. Garnett Wright, assistant lecturers in Surgery; Mr. J. H. Andrew, demonstrator in Metallurgy; and Mr. Harold Gerard, demonstrator in Electro-Technics.

UNITED FIELD NATURALISTS.

There was not such a good attendance at the summer meeting at Hodge Gardens, Broadbottom, as usual. So close on Whit-week, and sandwiched betwixt Coronation week and a very unsettled Saturday afternoon and Sunday morning, it told considerably against the attendance. As the afternoon turned out splendid the numbers improved a little.

A large number of botanical specimens found their way to the tables, the naming of these being undertaken by Mr. Dinsley, and Mr. Seth Ratcliffe undertook the naming of the ferns. The plants included the baneberry, the alkanet, white and black bryony, dame's violet, *Claytonia sibirica*, elecampane, deadly nightshade, the Portugal laurel, and the Alpine sow-thistle.

Mr. R. Cottam forwarded larvæ from the South of England.

In the afternoon Mr. Fredk. J. Stubbs, curator of Stepney Borough Museum, gave a lecture on "Local Mammals." An extended account of this will appear in our next issue.

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The Huxley Gold Medal has been awarded by the Royal Anthropological Institute to Honorary Professor W. Boyd Dawkins, F.R.S.

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On Saturday, July 22nd, the Liverpool Botanical Society have an excursion to Croston, proceeding from there to Rufford, under the leadership of Mr. W. G. Travis.

On the same day the Warrington Field Club are due at Ince.

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A cross has been erected in Rhyddings Park, Oswaldtwistle, as a memorial of the Coronation, the gift of Mr. W. W. Simpson, of Winckley Hall, near Whalley. On Greenwood's map of Lancashire, 1816, this monument is named Hippings Cross, and it marked the ford across the brook by hippings stones (or stepping stones). As far as the evidence obtainable allows, the new cross has been made a copy of the old one.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 98.)

19 { Pale tawny, flesh *thin*, *hygrophanous*, 5-9cm. *H. velutinum* Fr.
Firmer *fleshy*, *not* hygrophanous, 5-7cm.; gills brownish, edge whitish. Stem fibrillose or squamose 20

20 { Cæspitose, dirty white or centre brownish 21
Solitary, brownish then pallid, gills serrulate. *H. storeum* Fr.

21 { Gills *exuding drops*, stem brownish *H. lacrymabundum* Fr.
Stem whitish; *base yellowish*, odour strong *H. cotoneum* Q.

Inocybe Karsten.

MOSTLY SMALL, DRY AND FIBROUS ; GROWING ON THE GROUND.

1 { Spores rough 2
Spores smooth 18

2 { Cystidia present on the hymenium 3
Cystidia absent (*stains should be used for certainty*) ... 17

3 { Stem whitish or pallid 4
Stem coloured 9

4 { Gibbous, whitish-yellowish, 6-10cm., gills free *I. fibrosa* K.
Fulvo-ochraceous, 6-7cm., gills *subdecur*...*I. duriuscula* Rea.
Pileus from 1-5cm. only... 5

5 { Brown-cinnamon, becoming rimose ; spores *subglobose*, *stellately-nodulose*, 10-13*u* *I. asterospora* Q.
Spores irregularly oblong, nodulose 6

6 { Becoming longitudinally rimose, fibrillose, umbonate 7
Not cracked but silky or fibrilloso-squamulose ... 8

7 { *Lubricous*, fawn, gills adnexed, fimbriate *I. præterviso* Q.
Pallid, umbo bay, gills adnate, *ventricose* *I. proximella* K.

8 { Entirely white ; 1-3cm., smell earthy ; gill free *I. infida* Mass.
Whitish, 2cm., umbo pale tan, *viscid*, drying. *I. trechispora* K.
Rufescent, 3cm., dry, gills adnexed, fuscous *I. scabella* Fr.

9 { Cæspitose (*a*), to densely cæspitose (*b*) 10
Not cæspitose 11

10 (*a*) brown drying hoary 2-3cm., subsquamulose *I. maritima* Fr.
(*b*) pale tan, disc rufous, 5-7cm., *squarrose-scaly* *I. fasciata* C. & M.

11 *Fragrant*; whitish tawny, rufous fibrils, 2cm. *I. Trinii* Fr.
Without fragrant odour (of clove-pinks) 12

12 Yellowish-brown or tawny-grey, 2cm., spores *globose*, 10-12*u*, with *cylindrical papillæ* *I. calospora* Q.
Spores irregularly *oblong*; nodulose or warted ... 13

13 Pileus more or less squamulose; brownish-umber ... 14
Pileus slightly fibrillose or floccosely-silky 15

14 *Paler, hoary, when dry*, 2-3cm., stem apex naked *I. maritima* Fr.
First velvety, 1-2cm., stem apex white, *mealy* *I. lanuginosa* K.

15 Pileus 1.5-3cm. 16
6-12mm., disc tawny, rest yellowish-olive *I. fulvella* Bres.

16 Rufous-brown, 2-3cm., stem *stuked glabrous* *I. scabella* Fr.
Fawn, disc brown, 1.5-2cm., stem *solid fibrillose*. *I. Renneyi* B.

17 Fibrillose, fawn, 3-5cm., sp. *subglob.* 8-9*u* *I. margarispora* Berk.
Brownish, 1-2cm., sp. 15-17 x 8-9*u*, *basidia very large* ... ... *I. Buchnalli* Mass.

18 Cystidia present 19
Cystidia absent 45

19 Stem whitish or pallid 20
Stem coloured 33

20 Gills brownish, ochraceous or cinnamon 21
Gills with an olive tinge 31

21 Stem more or less hollow; smell absent, gills adnexed 22
Stem solid 23

22 Yellowish-white, 3-5cm., stem *glabrous* *I. sindonia* Fr.
Whitish-rufescent, 2cm., *splitting*, stem apex *mealy* *I. descissa* Fr.

23 Pileus becoming cracked, 1.5-5cm., yellowish-brown 24
Pileus torn into fibres, not cracked 25
Pileus not cracked, silky-fibrous or satiny 28

24 Obtuse; gills adnexed; smell earthy ... ...*I. rimosa* Fr.
Umbonate, gills *abruptly adnate*, smell mealy *I. eutheles* B.

25 White, umbo glaucous-green, 4-6cm., *scented* *I. corydalina* Q.
Pale ochre (26*a*) or fawn (26*b*). Smell strong ... 26
Tan (*a*) to bay (*b*) adpressed-scaly, 1.5-3cm. Odourless 27

26 *a* Smell sweet, 4-7cm., gills crowded adnate. *I. pyriodora* Fr.
b Unpleasant; 3-5cm., fibrillose, gills distant *I. cervicolor* Q.

27 *a* Gills *adnexed*, crowded, stem 3cm., cortinate *I. scaber* Fr.
b Gills adnate, subdistant, stem 4-7cm. *I. deglubens* Fr.

28 Tawny, edge pallid, 2cm., slightly *viscid* *I. Whitei* B. & Br.
Pileus not viscid, generally whitish 29

29 Entirely white, 5-8cm., obtuse, smell strong. *I. sambucina* Fr.
Pileus 1.5-3cm.; gills nearly free 30

30 Obtuse, whitish; gills *pallia*, edge white. *I. Clarkii* B. & Br.
Conico-expanded, white (also lilac, yellow, rufescent). Gills soon ochreous. Smell earthy... ... ... *I. geophylla* Fr.

31 Olive-brownish or fawn, 2cm., gills soon olive, smell strong, radishy ... ... *I. lucifuga*
Whitish or rufescent, 3-8cm, rimose, smell unpleasant 32

32 Gills uncinate, stem striate, sp. 8-9 x 5-6*u* *I. destricta* Fr.
Becoming suffused rosy-ochraceous, gills free, stem subbulbous, spores 9-12 x 5-6*u* *I. Godeyi* Gill.

33 Gills brown, ochraceous, or cinnamon 34
Gills tinged olive... 43
Gills brownish-violet, pileus dusky brown, squarrose-scaly, 1-3cm., stem apex lilac *I. cincinnata* Fr.

34 Odour strong (*a*) of ripe pears; (*b*) mealy or unpleasant 35
Odour weak or none 38

35 *a* Yellowish-red, 7-8; stem apex mealy *I. incarnata* Bres.
b Mealy or unpleasant 36

36 { Rufous-chestnut, 4-8cm., gills uncinate *I. Rhodiola* Bres.
Smaller, 1.5-2.5cm 37

37 { Brown, suffused violet, *obtuse*, fibrillose ... *I. obscura*
Reddish-brown, strongly *umbonate* ... *var. rufus* Pat.
Brown-fawn, *umbo.*, stem apex squamulose *I. flocculosa* B.

38 { Umber, 2-3cm., with long dark fibrils, *flesh red*, stem base green ... ...*I. hæmacta* B. & C.
Not everywhere changing red when cut 39

39 { 4-9cm., dull brown, squarrose-scaly, stem same. *I. hystrix* Fr.
Not clad with *revolute* scales; smaller... 40

40 { Brownish, 2-3cm., stem *stuffed*, flesh *reddish*..*I. lacera* Fr.
Stem solid 41
Stem hollow 42

41 { Tawny-ochre, 3cm., *very fibrillose*, stem same. *I. cæsariata* Fr.
Chestnut, 0.5cm., *cracked*, gills crenulate ...*I. brunnea* Q.

42 { Dusky brown, 2cm., concentrically fibrillose *I. carpta* Fr.
Whitish, adpressed darker scales, 3-5cm., obtuse. *I. mutica* Fr.

43 { Whitish-rufescent, 3-7cm., odour of pears *I. Bongardi* Fr.
Brownish-olive (*a*), dingy-brown (*b*). Odour absent 44

44 { *a* *Umbonate*, 2-5cm., floccose, stem *imperf. hollow* *I. dulcamara* Fr.
b Obtuse, 2cm., squarrose-scaly, stem solid *I. relicina* Fr.

45 { Stem whitish or pallid ; gills brownish or tan ... 46
Stem coloured 48

46 { White, 2cm., viscid, glabrous, stem downy *I. vatricosa* Fr.
Pileus (*a*) fuscous or (*b*) rufous-brown tinged yellowish 47

47 { *a* Streaked dark fibrils, 6-10cm., stem 6-10cm. *I. perlata* Cke.
b Silky-scaly, 1.5-3cm., stem 2-2.5cm., stuffed *I. perbrevis* Fr.

48 { Gills brownish, ochraceous or cinnamon 49
3-6cm., yellow-brown ; gills *dusky-olive* *I. fastigiata* K.

49 { Pileus squarrosely-scaly (*a*) ochraceous (*b*) dusky-brown 50
Pileus silky fibrillose or with adpressed scales ... 51

SOCIAL GROUPS AND ADAPTIVE CHARACTERS IN THE BRYOPHYTA.

By J. A. Wheldon, F.L.S.

(Continued from page 82).

Some species of *Mnium*, *e.g.*, *M. rostratum*, *M. cuspidatum*, and *M. affine*, emit trailing barren shoots from the bases of the erect fertile stems. The leaves of the latter show the ordinary transversely imbricate leaf arrangement, whilst those of the procumbent shoots are more lax and spread out in two lateral rows. *Mnium hymenophylloides*, which derives its name from its frond-like appearance, is stated by Mr. Dixon to be only a shade-grown state of the nearly allied *M. hymenophyllum*, most of its distinctive characters being due to growth under abnormal conditions of light.[16] He cites a similar variation in *Mniobryum albicans* when growing in caves in Ireland, and all bryologists will be familiar with the occurrence in dense shade of complanate states of *Mnium hornum*, *Brachythecium rutabulum* (Figs. 20-21), *Eurynchium megapolitanum*, *E. prælongum*, and many species of *Hypnum*.

The etiology of the beautifully circinate or falcate-secund leaves found in such plants as *Hypnum Wilsoni*, and many *Dicranaceæ*, etc., long seemed unexplainable. The condition appeared to be governed by no uniform set of environmental factors. Prof. Barker once suggested to me that he thought the secund direction of the leaves may have arisen from growth in running water, and that its survival in many dry land species may be an instance of an acquired character becoming hereditary. But there seems to be as great a probability that this particular arrangement is a direct response to the influence of light. In any case it is singular how persistently some species adhere to this divergence from the normal foliation. It is remarkably constant in *H. Wilsoni*, *H. Sendtneri*, *H. revolvens*, *H. intermedium*, *H. cristo-castrensis*, *H. revolutum*, *H. procerrimum*, *H. callichroum*, *H. hamulosum*, *H. Bambergeri*, *Dicranum uncinatum*, *D. majus*, *D. falcatum*, *D. fulvellum*, and *Andreæa nivalis*.

On the contrary, the leaves are sometimes straight and sometimes falcato-secund in *Sphagnum subsecundum*, *Andreæa Rothii*, *Campylopus atrovirens*, *Dicranum scoparium*, *D. Bonjeanii*, *D. fuscescens*, *Dicranodontium longirostre*, *Philonotis fontana*, *Hypnum aduncum*, *H. fluitans*, *H. exannulatum*, *H. ochraceum*, *H. filicinum*, and *H. cupressiforme*.

In the same genera with the above are many closely allied forms, which hitherto have not been known to produce falcato-secund leaves under any conditions.

In the majority of species exhibiting this leaf arrangement, the leaves have comparatively long and fine points, and the stems grow in densely cæspitose tufts, in which under ordinary conditions of growth a dense array of sharp points is presented to the light. These points consist of the apices of the stems, around the growing point of each of which the leaves are rolled in an elongate bud-like mass. In the outermost leaves great metabolic activity is taking place, these having to elaborate food for the young leaves in the interior of the "bud." In order to obtain the maximum amount of light, by a kind of heliotropic movement, the apical shoot bends over in the form of a hook, thus presenting the broad lamina, instead of the point, to the light. The younger leaves have impressed upon them the same curvature, and as leaf after leaf unrolls, they are all found to be bent and directed in like manner to the side of the stem. It will be noticed that in nearly every instance the apical leaves, where physiological activity is greatest, show this curvature the most markedly. In *Hypnum aduncum* the lower leaves, whose functions are practically finished, often become straighter or vaguely directed, whilst the apical ones form a decided hook.

But few of the elaborate devices seen in the higher plants are employed for the protection of the chlorophyll in the leaves of the Bryophyta. The cell structure of mosses is quite simple,

and as already shown, mostly unistratose. Kerner[17] has explained how the chlorophyll-bodies move under the influence of an increase or decrease of light, taking up a position on the open surface of the cell (position of Epistrophe) or ranging along the side walls (position of Apostrophe), according to its intensity. In shade-grown species with convex cells, such as *Hookeria lucens*, the chloroplasts collect on the floor of the cell, and the convexity of the upper surface acts like a lens and concentrates the light upon them.

In thalloid hepatics, however, epidermal cells, with few chloroplasts, occur in such xerophytic forms as *Reboulia*. The undersides of the fronds frequently have one or more strata of empty cells, and overlapping rows of scales. When the plant rolls up in dry weather these are exposed to the sun's rays. In *Reboulia*, *Riccia*, and *Targionia*, &c., the underside is also protectively coloured of a reddish tint. This appears to be most developed in the strongest exposure to light. Plants of *Riccia glauscescens*, collected by the writer and Mr. Albert Wilson on exposed limestone scars near Silverdale, showed richly coloured purple scales, but after growth for several months in a damp shaded greenhouse, the colour completely disappeared. This purple tinge is common in plants of exposed moorlands and mountain slopes and rocks. It is seen in *Frullania tamarisci*, *Scapania purpurascens*, *Mylia Taylori*, *Pleurozia cochleariformis*, *Marsupella alpina*, and other hepatics, and amongst the mosses typical examples are seen in *Sphagnum rubellum*, *Andreæa alpina*, *Leptodontium flexifolium*, *Bryum alpinum*, *B. pallens*, *B. arcticum*, *B. Muhlenbeckii*, *Orthothecium rufescens*, *Hypnum sarmentosum*, *H. revolvens*, and *H. scorpioides*. Many of these readily lose their red colouration in shady places, and it is found to vary in intensity according to the amount of exposure. In very dry and sunny seasons many mosses which are usually green assume reddish or brownish tints. This may be noticed in the capitula of *Sphagnum papillosum* and *S. cymbifolium*; and in *S. recurvum* a deep colouration is frequently seen at the

end of the summer. *Sphagnum teres* when occurring in shaded birch swamps is usually green, but on open sunny moors it becomes of a rich brown shade.

The colour of the gemmæ, produced at the apices of the stems and from the upper leaves of hepatics, also depends largely on the degree of light exposure. In *Lophozia ventricosa* they are yellowish green, becoming darker in open places; in the more alpine but nearly allied *L. alpestris* they are often of a rich purple colour; and in *L. gracilis* they vary from yellowish to brown according to situation.

The apical cells of the leaves of many mosses which grow in exposed situations are frequently almost or quite devoid of chlorophyll. These hyaline cells may be limited to the excurrent part of the nerve or extend to the leaf-blade. They not only protect the plants from the direct rays of the sun, but also afford a shield against cold and drying winds. In extreme cases the moss cushions present a hoary or woolly appearance, as may be observed in many species of *Tortula*, *Grimmia*, etc. In *Bryum argenteum* (Fig. 22), the effects of external influences are readily seen on comparing its various forms. In the typical plant the moderately long hair point and a small portion of the lamina are hyaline. Between this and *var. majus* (Fig. 24), which occurs in very damp shady places, a number of intermediate states occur, culminating in one in which the point is reduced to an apiculus and all the cells are chlorophyllose. On the other hand the type is connected by many forms occurring in dry, sunny places, with the *var. lanatum* (Fig. 23) in which half the leaf and the long arista are hyaline. *Tortula muralis* (Fig. 28) and *T. pusilla* vary in a similar manner and have almost parallel "varieties," as also have some species found on open moorland and subalpine slopes, especially *Grimmia*, *Rhacomitrium*, and *Campylopus*.

(To be continued.)

SOME NOTES ON THE HYDROZOA AND POLYZOA.

By Joseph Smith, M.R.I.A.,

Fellow of the Royal Society of Antiquaries, Ireland.

Primam esse historiæ legem, ne quid false discere audeat, diende ne quid vere non audeat.

Cicero De Orat. III.

As referred to in a previous paper, the infinitely small has ever possessed a fascination even for those only slightly interested in the development of the members of the vegetable and animal kingdoms, and many curious theories have resulted, only to be eventually rejected on that vital question, the methods adopted by the various structures in assuming the adult shape or form. The early naturalists advanced some very striking—nevertheless true—hypotheses bearing on the point and its surroundings, but the assistance at the time available was not a means of enabling them to further investigation on the subject, and thereby demonstrate the accuracy of their statements, some of which are now recognised as being the very fundamental principles of life. So late as the present century Harvey enunciated that *omne vivum ex ovo* was one of the chief principles of existence, but beyond the enunciation of the theory he was unable to go, and biology gained nothing but the statement, which, apparently without meaning, was, many years after the death of him who had first suggested it, demonstrated to be the great fundamental or keystone of the arch on which the development of all animal life rested. One of the branches in natural history most favoured by biologists for investigation is the sub-kingdom Invertebrata, *i.e.*, animals furnished with soft bodies, but not possessing any vertebrate or backbone, and a division which has absorbed great attention—the study of which has not been without its advantages to the naturalist generally—is that section including those animals commonly known by the term Zoophytes, for which Linnæus established later the genus Zoophyta. Such have been objects of special interest, if the

microscope, which of late years has been so greatly improved, finds a place amongst the instruments of observation. I have in my previous paper dealt with the term Zoophyte and its incongruity.

Although in past years much was done tending to popularise this interesting branch of study, the naturalists of the middle ages possessed very little knowledge on the subject, and the doctrine of elementary structures, whether in plants or animals, only began to excite the consideration of morphologists about the middle of the seventeenth century. The ideas relating to the structure of the various bodies became at that period more concentrated, and the use of the simple microscope which was introduced by Malphigi and those contemporary with him—to assist them in their anatomical investigations—was the means of a much greater knowledge being acquired on the subject. It would appear that previous to this date nothing superior to the simple lens had been in use, yet considering the difficulties which had to be surmounted before any minute investigation could be followed up, the results obtained are marvellous.

Although it has been pointed out that the great Aristotle wrote concerning *partes simulares et dissimulares*, and that Fallopius must necessarily have been acquainted with, and possessed some knowledge of tissues, it is nevertheless considered that the ideas and knowledge of these great philosophers on the tissues of the human body—at the time the *opus maximus* of science—were faulty and superficial. With the improvements in the microscope new discoveries were soon made. Leeuivenhoek and Rusch were engaged in the investigation of embryology, but were so deeply occupied with teaching, that histology made very little advance, and for the time—throughout the greater part of the eighteenth century—was practically at a standstill. A few leading men of science, including Lieberkühn, Fontana, and Heuson, were, however, working at the subject, and they contributed much to the knowledge made known by their predecessors, so that no

attempt to introduce the microscope as an adjunct in the investigation of the tissues of the human body, and the examination of all forms of minute life was apparently made, previous to the beginning of the eighteenth century. It will not be therefore difficult to appreciate the work done by naturalists during the two preceding centuries, and although an extensive knowledge of the various forms of life was not attainable, nevertheless facts hitherto unknown were brought to light, and assisted to the further and more important discoveries made, when greater facilities for the investigation of the various minute forms of animal life became available in the improvement of the microscope.

Prior to the sixteenth century the animals known as Zoophytes were claimed by two different sections of naturalists, the botanists arguing for them a vegetable origin, and the pseudo-geologists—for geology as a science was at the time unknown—who strove to demonstrate the mineral organisation of these structures, hence it has been doubted whether Ferrante Imperator, who, so far back as the year 1599, is reputed to have demonstrated that these structures really belonged to the animal kingdom, fully understood the nature of his communication. De Blainville states openly that he did not, but Lamouroux inclines to the opinion, that notwithstanding all Ferrante said on the animal affinity of these structures, he had no distinct idea of the animal nature of zoophytes, and continued with other naturalists of his time, to regard them as having a vegetable origin.

Peysonnel some years afterwards—about 1729—exposed the fallacy of the idea of a vegetable origin for Zoophytes, but such an astounding announcement, which was contrary to the accepted theory of the age, though correct, had little hope of meeting with consideration. It is. however, questionable whether the announcement, had it been made earlier, would not have found favourable acceptance with the naturalists of the period, and been the means of bringing about a complete

revision in the classification, but unfortunately for Peysonnel's pleadings, they were prejudiced, as I have stated elsewhere, by the publication of Marsigli's observations on the polypes. I have shown Reaumur's unaccountable action, after being taken up by Peysonnel's theory, in first reading it before the Academy of Science at Paris and then denouncing it. No further attempt was, after this incident, made to correct the erroneous theories respecting these structures, which unfortunately had been extended by the publication of Marsigli's essay, until Trembley in 1841 printed the results of his investigations on the Hydra, and also announced his discovery of the *Lophopus crystallinus*. Baker two years afterwards repeated Trembley's experiments with the Hydra, and these becoming known to Reaumur, who, although opposed to the arguments of Peysonnel, was yet not very steadfast in the orthodoxy of the theory of the vegetable organisation of Zoophytes, tested the accuracy of Baker's experiments. These experiments consisted in the artificial reproduction of the Hydra by fission, and the remarkable results which originated from cutting the animal into sections. Each section amplified to a perfect animal. This peculiarity has, however, been misunderstood by many naturalists, who have without any further investigation taken the *ipse dixit* of experimenters, and interpreted it so as to suit their own views, hence the pieces into which the Hydra has been divided became to be regarded as being exceedingly minute, whereby multiplication of the animal could be carried out, to the freak of the pseudo-investigator. Now experiment has undoubtedly demonstrated and proved the fact that the Hydra will produce itself by fission or division into parts, but there must be existing in the particles so detached from the parent form, certain cells necessary for the development and amplification of the detached or separated part, so that in each section must be embodied both ectoderm and endoderm cells. The Hydra has furnished much interesting material for discussion, and one of the experiments which is recorded as having been successfully performed with the animal, is that of reversing it, *i.e.*, turning

it inside out, with the result that the Hydra after the operation has adapted itself to the change with equanimity, and without any apparent inconvenience. This experiment has been called into question by several eminent naturalists, and great difficulty exists in obtaining any trustworthy description of the experiment; but it is apparently unreasonable to assume that the ectoderm and endoderm exchange places, for there is no explanation how the ectoderm can perform the functions of the endoderm, nor this latter fulfil the functions of the ectoderm, since each is formed of differently constructed cells, arranged and constituted for the successful economy of the Hydra. If, however, the ectoderm and endoderm are reversed, the animals will make a strenuous effort again to right themselves, and will undoubtedly succeed ; if failure attend their attempts then a new growth of ectoderm arises around the base of the tentacles, and spreads over the animal. No doubt investigators who have successfully performed this reversion of the Hydra have, without carefully observing life immediately after the experiment, merely noted whether the animal lived or not, and consequently the fact that in all probability it reverted to the original state in which nature formed it has been overlooked, or the possibility of its reproducing a new ectoderm layer has not been considered. The power of the regrowth of the Hydra from fragments has been much exaggerated, and the matter has been reviewed by Englemann in *Zool. Anzeiger*, Vol. I., pp. 77-8, 1878, and also by W. Marshall in *Zeitchr. für Wiss Zool.*, Vol. XXXVII., pp. 664-702, esp. page 682, 1882. Milsikuri throws considerable doubt on Trembley's experiments, in a paper published in the *American Naturalist*, Vol. XXI., pp. 387-8 and 773, 1887. I am indebted to Mr. O. H. Latter, of Godalming, for directing my attention to these papers.

Baker's experiments consisted in the artificial reproduction of the Hydra by fission, and the remarkable results which thus ensued from the cutting into pieces of the Hydra, and the amplification of each section to a perfect animal. A further

experiment was the fusion of two separate animals into a single organism, by transfixing the separate animals on a horse hair, so that the bodies were contiguous ; each assimilated the other, the result being one organism.

These, the summary of which was embodied in a public letter addressed to the Royal Society, attracted the attention of Parsons, who devoted some time to these investigations, but what success attended his labours is not recorded.

The gain to science resulting from these discoveries was invaluable, and several naturalists, criticising the results of these new discoveries, reverted to the arguments set forward by Peysonnel, in support of the animal structure of zoophytes. Reaumur, who had once more considered Peysonnel's theory, suggested to Jussieu and Guettard, that they should undertake an independent investigation of the question, and for this purpose they went down to the coast, there spending some considerable time conducting their experiments, which so strongly supported the accuracy of Peysonnel's observations that Jussieu in 1842 undertook to write a memoir for the Academy of sciences giving detailed results of their work, and in which he defined in very clear and unmistakeable language, that the marine organisms examined by them, and more particularly *Alcyonium digitatum*, *Tubularia indivisa*, *Flustra foliacea*, and *Cellepora pumicosa*, organisms which up to that period had been considered to belong to the vegetable kingdom, were nothing more or less than productions of a marine animal.

The progress of truth was slow withal, and notwithstanding this invincible evidence against the old idea, and so favourable to the animal essence of Zoophytes, the theory was regarded with suspicion, and not finding any support, was scouted from the rooms of the Royal. The question was now laid to rest for some years, until Ellis, who was a naturalist very indifferent to the surrounding impressions on the subject, sounded the death-knell of that theory purporting to Zoophytes either a vegetable

or mineral origin. A man of means, he had for some years devoted his time to the study of natural history, and one of the fascinations he indulged in was the arrangement of seaweeds in the form of landscapes—a practice which has not become obsolete with time—the rougher stemmed specimens being utilised for trees and shrubs, to give a woodland or heathery appearance to his productions. To aid him in perfecting these algæological pictures he used a simple microscope, and noticed that the texture of the rough stalked and pitted so-called seaweeds was such as to favour the probability of their being the production of some species of animals rather than results of vegetable growth. For the special purpose of testing the accuracy of his surmise on this point, he made several journeys to the coast in order to obtain the material fresh and examine it on the spot. The details of his observations were submitted to the Royal Society in the form of a monograph, and in this work he also extensively reviewed the position occupied by these organisms in the scale of nature, clearly demonstrating their affinity to the animal kingdom, and showing they possessed a body similar in appearance to that of the Hydra. Biologists now interested themselves still more deeply in the morphological changes which affected these forms of animal life, and stand greatly indebted to Ellis for his demonstration of the animal type of Zoophytes, and for having cremated, so to speak, the time-accepted theories of their vegetable and mineral origin. He continued his investigations in the same direction, adding much valuable information on this section of the Invertebrata to the knowledge of the time. The final results of his labours was given to the public in detail during the year 1755, entitled "An Essay towards the Natural History of Corallines and other Marine productions of the like kind commonly found on the coasts of Great Britain and Ireland.' Although published so long ago the work is still regarded as a marvel of scientific accuracy, and in describing the various forms, Ellis made use of popular names which they retain to the present day. During his labours, he evidently corresponded on the subject with a Dr.

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Buttner, who at the time was a professor in the University of Gottenberg, but what connection existed between the two is not exactly known, nor whether Buttner assisted Ellis in any of his investigations. The only information recorded is the fact that the German professor repaid this friendship by claiming all Ellis's discoveries as his own.

The work of Ellis having received the approbation and *nihil obstat* of the Royal Society, became the recognised treatise on the subject, and the study of this branch of the Invertebrata rallied. The Copley medal was awarded him for his observations in Natural History, but it was principally on account of his great work the distinction was conferred on him, for Sir John Pringle, the President for the time being, when presenting the medal clearly made this understood in the following words :— "Although Ellis has opened such a wonderful view of some of the most extraordinary productions of Nature, and has pursued his studies with sagacity and judgment, he might reasonably have expected many testimonies of his successful labours in Natural History, yet that medal was delivered to him as an express testimony of their approbation of his excellent papers on the animal nature of the genus of Zoophytes called Corallina and of the Actinia Societa."

The impetus thus given to the study of the Corallines brought Ellis into great repute, and eventually into communication with the great Linnæus himself, who partially adopted his views on these subjects.

(To be continued.)

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On Whit Wednesday, at the Manchester University, Mr. A. Loveridge lectured on snakes.

On June 22nd a small party of Liverpool botanists paid a visit to Knott End. The original intention was to visit the Cockerham Moss, but conveyances could not be obtained. A good day was spent.

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Wayside Leaves.

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The Report of the Botanical Exchange Club has just been issued. Its title is changed to the "Botanical Exchange Club and Society of the British Isles," and in addition to the balance-sheet and lists of members and contributors, it contains a Report by Mr. Druce, the secretary, on "Plant Notes for 1910," in which many new facts on British Botany are alluded to. *Saponaria officinalis* L. *var. hybrida* L. is queried for Lancashire. Can any local botanist throw any further light on this than is contained in the old Liverpool Floras ?

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The evident oversight of using the brief comment "J A. Wheldon in lit." instead of a reference to the account of *Cornus suecica* appearing in the *Lancashire Naturalist* is misleading, and might imply that the gentleman named claimed the credit of discovery. *Cornus alba*, a native of Siberia, is recorded from Flint, and here the paper in *Journal of Botany* is quoted. Several interesting aliens from St. Annes are reported by Mr. C. Bailey. A specimen sent by Rev. M. Toohey from Prescot is referred by Mr. Druce to *Medicago lupulina var. unguiculata* Ser. Mr. Wheldon raises an interesting discussion on Fairhaven examples of *Galium Witheringii* Sm., on which is elicited a statement from Dr. Moss that the description in Babington's Manual is erroneous, and that *G. Witheringii* is the only marsh bedstraw obtained on the siliceous soils of the Pennines between Ingleborough and the Trent Valley. The radiate form of *Senecio vulgaris* occurring on the Freshfield sandhills was sent by Mr. Travis, and Prof. Trow suggests that it comes near his *var. erectus*.

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Much other interesting information is given on specimens which are not of local interest to Lancashire readers. Opportunity is taken of the termination of the second volume

of the Reports to give a brief history of the Society, which appears to have originated as a branch of the Botanical Society of London in 1838. Mr. J. A. Wheldon, F.L.S., is announced as Distributor and Editor for next year.

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The Reports of the Exchange Club may now be purchased by outsiders at 5s. per copy, from Mr. Druce, of Oxford.

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The Liverpool Botanical Society will lose a very active worker in the person of Mr. H. J. Wheldon, who has taken up an appointment at Coventry. In no department will he be more missed than in connection with the library. It is his intention to keep in touch with Lancashire nature work as far as possible, and he will continue to list the South Lancashire fungi if specimens are sent to him for recording. His new address is Priory Lawn, Ellys Road, Coventry.

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Botany is likely to receive much attention during the winter. The educational side will be very much in evidence. As will be seen elsewhere, the Liverpool Society is promoting a series of competitions intended to further the study, and to lend an added interest to the work of the younger people. The Workers' Educational Association at Blackburn have been encouraging their members to take up botany for some time, and for the coming session have arranged for a course of six lectures on nature study, the first to be delivered by Prof. Weiss.

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The Blackburn Field Club visited St. Anne's and Fairhaven during July. A few of the members availed themselves of the opportunity to spend the day there, and the characteristic plants of the sandhills were met with, though the extensive building operations are fast sweeping some of them away.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 98.)

50 { *a* 1-2cm., gills *tan* ; odourless ; stem *floccose* *I. hirsuta* Fr.
b 3-6cm., gills *rusty*, stem squarrose-scaly, base bluish, odour strong, flesh reddish *I. calamistrata* Fr.

51 { Dusky- or yellow-brown, 2-5cm., stem hollow *I. echinata* Roth
Yellowish to lurid-yellow (*a*), yellow-brown (*b*) ... 52

52 { *a* Fibrous-scaly, 6-8cm. ; spores 14-16 x 6-8*u* *I. mimica* Mass.
b Fibrillose, cracked, 3-5cm., spores 8-10 x 5-5.5*u* *I. Cookei* Bres.

Lactarius Fries.

ALL THE SPECIES (EXCEPT *L. obliquus* Fr.) GROW ON THE GROUND.

SPORES SUBGLOBOSE, MINUTELY ECHINULATE (EXCEPT *L. involutus*).

1 { Milk becoming *yellow*, acrid - - - - - 2
Milk becoming *lilac*, or violet - - - - - 5
Milk *lavender-grey*, slightly acrid, pileus flesh colour or greyish, depressed, papillate - - *L. vietus* Fr.
Milk blood-red, saffron, becoming reddish or brownish 6
Milk becoming *glaucous-green*, p. whitish, gills crowded ; formaline turns flesh blue *L. glauscescens* Crossl.
Milk persistently white or nearly so - - - - 11

2 { Zoned, apricot, milk *golden*, stem white. *L. chrysorrheus* Fr.
Milk pale primrose or sulphur yellow, stem coloured - 3

3 { Stem *pitted*, yellowish ; margin of pileus incurved - 4
Stem *even*, *tawny-rufous*, pileus same 3-6cm. *L. theiogalus* Fr.

4 { *Umbilicate*, 10-20cm., zoneless - *L. scrobiculatus* Fr.
Infundibuliform, 10-14cm., somewhat zoned *L. intermedius* Kr.

5 { Grey with darker zones, milk sweet - *L. violascens* Fr.
Dingy straw, zoneless, 5-9cm., *gills narrow* *L. aspideus* Fr.
Dingy tan, zoneless, 3-7cm., *gills broad* - *L. uvidus* Fr.

6 { Milk saffron-red (*a*) or blood-red (*b*) changing to green 7
Milk white then reddish (*c*, *e*) or white, rose to saffron (*d*, *f*) 8
Milk soon brownish; pileus black-olive, rough. *L. fluens* Boud.

7 { *a* Acrid, 7-12cm., zones darker, gills saffron *L. deliciosus* Fr
b Mild, 6cm., seldom zoned, gills white *L. sanguifluus* Fr.

8 { Acrid, or soon so ; pileus *not* velvety - - - 9
Mild ; pileus *velvety*, *radially rugulose*, smoky-brown, 4-8cm. - - 10

9 { *c* 6-7cm., moist, umber-grey ; stinking - *L. acris* Fr.
d 4-9cm., sooty-tan, dry ; odour faint *L. fuliginosus* Fr.

10 { *e* Spores reticulate, gills subdistant *L. retisporus* Mass.
f Spores min. echinulate, gills crowded *L. lignyotus* Fr.

11 { 4cm., oblique, excentric, zoned grey ; odour strong *L. obliquus* Fr.
Pileus more or less central - - - - - - 12

12 { Milk mild - - - - - - - - - 13
Milk acrid or becoming so - - - - - - 25

13 { 3-5cm., tawny, *minutely punctulate*, edge *striate* *L. cremor* Fr.
Margin of pileus not striate - - - - - - 14

14 { 2-5cm., tan-olive to umber, gills yellowish *L. squalidus* Fr.
Tawny, rufescent, or pale ochraceous - - - 15

15 { 1cm., pallid tan, stem solid, spores 3-4*u* *L. minimus* W.G.S.
2-10cm. diam., spores larger, 5-10*u* - - - - - 16

16 { 6-10cm., umbil. viscid, pale tan, gills pallid *L. pallidus* Fr.
Gills rufescent or yellowish - - - - - - 17

17 { Stem solid. Pileus plano-depressed, glabrous - - 18
Stem stuffed or hollow - - - - - - - 20

18 { 2-5cm., tawny-brown, wavy, milk *watery* *L. serifluus* Fr.
Larger, 6-10cm, milk white - - - - - - 19

19 { Golden-tawny, middle sienna, *zoneless* - *L. volemus* Fr.
Tawny-reddish, *zoned*, more slender - - *L. ichoratus* Fr.

20 { Pileus downy, or floccose, 5-9cm., subumbo. then depressed 22
Pileus not tomentose, becoming depressed - - 23

21 { Dull salmon to sienna, stem *naked* - *L. tomentosus* Cke
Pale brick red or biscuit, stem pubescent - *L. helvus* Fr.

22 { First papillate, 3cm., orange, stem same *L. mitissimus* Fr.
Reddish or dusky cinnamon. Odour present - - 23

23 { 3cm., *papillate*, rugose, *punctate*, dusky cinnamon, zoneless, fœtid *when dry* *L. subumbonatus* Fr.
Convex then depressed, smell present *from first* - - 24

24 { Odour *oily*, *bug-like*, 5-8cm., rich sienna - *L. quietus* Fr.
Fragrant, 3-5cm., brownish-red to orange *L. camphoratus* Fr.

25 { Margin of pileus slightly striate or sulcato-crenate - 26
Pileus not striate - - - - - - - - 28

26 { Sooty-brown, zoneless, thin, umbilicate or depressed 27
Reddish to pale, *very thin*, with *acute umbo* *L. tabidus* Fr.
Olive-umber, 6-14cm., viscid, edge downy *L. turpis* Fr.

27 { 2-3cm., slightly striate, glabrous, gills yellowish. *L. obnulis* Fr.
3-5cm., sulcato-crenate ; more robust *var. crenatus* Mass.

28 { Odour well marked (when drying in *L. cyathula*) - 29
Odour weak or none- - - - - - - - 31

29 { Pungent, pallid, 3cm., gills pallid *L. scoticus* B. & Br.
Odour bug-like, oily (fugitive on drying in *L. cimicarius*) 30
Scent pleasant, greyish-yellow, umbo. acute *L. glyciosmus* Fr.

30 { Opaque flesh-col. or pink-buff ; gills decurr. *L. cyathula* Fr.
Sienna, shaded umber, gills rufescent *L. cimicarius* Phil.

31 { Whitish (or tinged reddish or ochreous); gills pallid - 32
Blackish-umber, olive-, fuscous-, or lead-grey - - 36
Bay, rufous, cinnamon, reddish, flesh colour or orange 44
Rosy-lilac, depressed, acutely umbonate - - - 31A

31A { Often zoned or spotted, minutely spiny, 2-3cm-, *L. spinulosus* Quel.
Margin tan, floccose, zoneless, 2-5cm. *L. lilacinus* Fr.

32 { Zoned or spotted red, 7-12cm., gills crowded *L. controversus* Fr.
All white, 2-4cm.; spores smooth, oval, 5 x 3*u* *L. involutus* Sop.
Larger, 5-18cm.; spores subglobose, echinulate- - 33

33 { Margin of pileus downy or shaggy fibrillose, 5-9cm. 34
Pileus not fibrillose, dry - - - - - - - 35

34 { Edge *shaggy*, involute ; slightly zoned *L. torminosus* Fr.
Edge *downy*, involute, zoneless ; more slender *L. pubescens* Fr.

35 { Gills adnate, *very* crowded, stem long *L. pergamenus* Fr.
Gills decurrent, crowded, forked, 2mm. *L. piperatus* Fr.
Gills *subdistant*, connected by veins, 4mm. *L. vellereus* Fr.

36 { Pileus viscid or glutinous - - - - - - 37
Pileus not viscid, dry - - - - - - - 39

37 { Olive-umber, *zoneless*, edge *yellow-downy*, 6-14cm *L. turpis* Fr.
Often somewhat zoned, 5-10cm., scarcely downy at margin - - - - - - - - 38

38 { Blackish-olive, viscid, convex, tufted - *R. fluens* Boud.
Olive-grey, glutinous, depressed, spores smaller *R. blennius* Fr.

39 { Stem stuffed or hollow. Pileus 5-8cm. - - - 40
Stem solid. Pileus depressed - - - - - - 42

40 { Pileus grey-downy or villose at first ; gills *crowded* - 41
Glabrous, grey or dull tan ; gills *subdistant* *L. pyrogalus* Fr.

41 { Grey-brown or greenish, stem *downy*, pallid *L. mammosus* Fr.
Umber to blackish, stem paler, glabrous *L. picinus* Fr.

42 { Gills *crowded*, pileus sooty to umber - - - 43
Lead- or lilac-grey, 7-12cm , wavy, *gills distant* *L. flexuosus* Fr.

43 { 8-14cm., umber, rivuloso-floccose, gills pallid *L. umbrinus* Fr-
5-8cm., sooty to black-brown, gills yellowish *L. plumbeus* Fr.

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MANCHESTER FIELD NATURALISTS.

At no period of the year can Silverdale be visited without affording the botanist intense satisfaction, and the members of the Society revelled in the good things which crossed their path on a recent visit. To some the plants growing on or close by the salt marsh were fascinating. The thrift is very abundant, and other plants occurring with it were *Glaux maritima*, *Plantago maritima*, *Triglochin maritimum*, etc. The sea hard-grass and the salt-marsh club-rush were also plentiful. On Warton Crags the ploughman's spikenard is pretty frequent, and the common ragwort, plentiful throughout the district, attracted particular attention by reason of the thick clusters of larvæ of the cinnabar moth with which they were mostly covered. The mountain species of St. John's-wort was the most interesting, and the wild carrot, which was very often met with, nearly always exhibited the characteristic red centre floret to the inflorescence. Saw-wort, hound's-tongue, wild basil, and common agrimony were seen in several localities. Black bryony was abundant in every direction. A proliferous variety of the rough cock's-foot grass was gathered. The juniper was abundant ; many wore ripening berries, and several buckthorns were seen with immature fruits. A very interesting example of seed dispersal was afforded by the curious stone on the shore, the crevices of which had specimens of brambles, a hawthorn, elder, ivy, sheep's fescue grass, cleavers, the autumnal hawkbit, broad-leaved plantain, yellow stonecrop, wall-rue fern, and several kinds of mosses and lichens. Special attention was drawn to these by the leader, who conjectured as to the various ways in which the seeds would have been introduced. The first four mentioned would have had their seeds brought there in a natural manner by birds ; the cleavers seed would probably have been entangled in feathers, or in the fur of some small animal that had climbed the stone ; the rest might easily have been blown on by the wind.

SOME NOTES ON THE HYDROZOA AND POLYZOA.

By Joseph Smith, M.R.I.A.,
Fellow of the Royal Society of Antiquaries, Ireland.

(Continued from page 140.)

The Corallines Linnæus had already assigned to a place in the animal kingdom, and accepting several of the propositions of Ellis, he included the horny and flexible Corallines in the same family, but to mark his objection to the full adoption of his correspondent's theory, he established a separate order which he termed *Zoophyta*, to include *Plantæ vigitantes, floribus animantis*, a definition which is taken to signify that the stems and branches of the Corallines were of vegetable origin, but that the polyps, or structures inhabiting these stems, belonged to the Animal Kingdom. Why Linnæus should have followed the course he did in this classification has from time to time been called into question, and various suggestions have been offered by his admirers to explain away his obstinacy in only partially embodying in his work the information existing on the subject at the time.

Some writers (Pennington, "British Zoophytes") plead his cause on the ground that as he "considered animals were only distinct from vegetables in the possession of a sentient nervous system, with voluntary motion, he had little difficulty in believing that polyps were animals, while the stems were vegetable, and yet that both were one organ." The diagnosis Linnæus himself gives, and which has suggested the above explanation as most feasible for the great naturalist's foible for excluding some of the then known facts in the life history of Zoophytes is curious. It is this, that motion of some kind was enjoyed by all living beings, "that plants on *terra firma* enjoy the motion of the air; that as in the depths of the ocean there exists perfect and undisturbed quiet, the Creator had endowed the terminal

portions of the Zoophytes with a nervous system and power of motion, that they might by their own motion partake of that enjoyment which the quiescent state of their watery abode could not supply."

Job Baxter, a Dutch naturalist, adopted the views of Linnæus, a step which may be rather regarded as a partial compromise or atonement for his bitter opposition to the views of Ellis, than as a recantation of his erroneous teachings on the subject. After personally investigating many of the examples mentioned by Ellis, and finding the accuracy of the statements to be established, he modified his opposition, but not possessing the courage to acknowledge his earlier views to be erroneous, and give up the position he had assumed in the matter, he availed himself of Linnæus' classification as the most convenient *via media* of meeting the truth of the case, and screening his shame.

Pallas also wrote on Zoophytes, and published a natural history of these organisms, likewise adopting the views of Linnæus, who found in him a very staunch disciple, but Ellis very strongly opposed his conclusions, and argued out to the end the animal origin of zoophyte life. Such controversy was naturally fruitful in good results, for now Ellis undertook to write a full history of the order, and with the assistance of his friend, the naturalist Solander, he began to arrange all the information on the subject he had for a number of years been gradually accumulating. Ill-health, however, delayed the work, and he had made no further progress beyond the preparation of the plates, and correlation of the notes, when death prevented the ultimate results of his labours being realised. Solander made arrangements for carrying out the intentions of his friend, and began to elaborate the notes for publication, but his death following shortly on that of Ellis frustrated the intention, and the work remained unfinished, and would probably have been lost, had it not been for Sir Joseph Bankes, who, recognising

the importance of the work as a valuable addition to the scientific knowledge of Natural History at the time, arranged that it should be brought out under the superintendence of Mrs. Watts, Ellis's daughter. It is unnecessary to offer any criticism on this addition to our zoological literature; it suffices to acknowledge that until 1828 Ellis's work was the only standard monograph, although the literature on the subject had been miscellaneously enriched from the pens of several naturalists

Otho Fabricius printed his *Fauna Greenlandica* in 1789, and which was followed five years later by Carolinus' memoir on marine polyps. Lemark and Lamouroux increased the list in 1815, the former by his *Animaux sans vertébres*, of which an English translation was published nine years afterwards, and was at the time the only work on the subject accessible (excepting the works of Ellis and Solander), and the latter by his *Histoire des Polypiers Coralligènes Flexibles.*

About this time Dr. John Hunter, the eminent physician, not satisfied with the accepted classification of the various groups of animals, appears to have personally worked out a system embracing the vital organs, as the basis for his classification, and elaborating it according to the arrangement of the organs of digestion, the position of the nervous system, the localisation of the generative organs, and the respiratory apparatus, eventually perfected an arrangement which was an improvement on the system adopted by Linnæus, and especially in tabulating a section of the Animal Kingdom according to the structure of the heart, by which those creatures wherein the duai functions of that organism and stomach were performed by the same organ should be tabulated under the Medusæ. The most prominent and valuable feature of Hunter's classification was the utilisation, as a basis, of the nervous system, which did much to approximate the more natural method of classification carried out in later years with such excellent results. A new and more important era in the development of the classification

of animals may be considered as entered on by the publication of Cuvier's *Animal Kingdom* in 1817, by which a classification was introduced arranging animal life under four sections or divisions, viz., *Vertebrata*, *Mollusca*, *Articulata*, and *Radiata*, the first three being defined exclusively on the arrangement of the nervous system as the primary distinctive characteristic. The fourth division, the *Radiata*, comprising the radiate animals and zoophytes, was not held in favour by naturalists generally, and the fact of the instance of a nervous system being discarded in favour of minor considerations necessarily led naturalists to revise this group, and to make a further sub-division. Those organisms, therefore, in which a nervous system could be detected were classified by Owen under the term *Nematoneurose* organisms—from *Nœma* meaning a thread and *Neuron* a nerve—while such as exhibited no trace of a nervous system were by McLeay assigned to a group by themselves which he designated *Acrinita*, from *a*, not, and *Krino* to discern. The Acrinita then included those animal organisms in which no nervous filaments were discernable, the neurine or nervous matter being presupposed to be diffused in a molecular condition throughout the body. The method of reproduction was in conformity to this diffused state of the nervine element, for not only are a great number of these animals capable of reproducing themselves by gemmation, spontaneous fission, etc., but by means of ciliated gemmules, and true ova. Hence under this division were included :—

SPONGES.
POLYPES, *i.e.*, HYDROIDS.
POLYGASTRIC ANIMALCULES
ACALEPHÆ, and
PARENCHYMATOUS ENTOZOA or STERELMINTHA.

The *Nematoneura*, which formed the second division of Cuvier's Radiata, included those animals in which the nervous filaments were discernible and possessing a greater differentiation, the nerve threads which render muscular motion possible can be

observed. In members belonging to this division the nerve threads of communication being co-apparent with the nervous filaments, we are enabled to distinguish fasciculi of muscular fibre, the consequent results of which are a higher and more perfect power of locomotion.

Moreover, the alimentary system is provided with distinct muscular and membraneous walls, and loosely attached in an abdominal cavity ; the circulation of nutritious fluid is stimulated by a vessel distinct from the alimentary organs. Another feature in the higher differentiated group is the cessation of reproducing themselves by fission, and they are androgynous, that is, capable of reproduction from ova without the co-operation of two individuals.

In this family are arranged :—

The BRYOZOA, or Ciliated Polyps.

ROTIFERA.

EPIZOA, or Cavity Entozoa, etc.,

CŒLELMINTHA, and

ECHINODERMATA.

Such were the classification labours of Cuvier, which tended much towards a clearer comprehension of the position each group of animals should occupy. He had already separated the Alcyonium from the Sertularian polypes, but the distinctions which are now known to exist in the Hydroida and Polyzoa were not at that time recognised.

Kerning published in 1828 a *History of British Animals*, and in this he also gives a description of British Zoophytes.

"It was about this time," Pennington says,* "the first step was taken towards a proper separation of the different constituents of the order Zoophyta, which resulted in the

* "British Zoophytes," page 13.

rejection of that name, and in the ultimate adoption of the present system of classification. The Actiniæ were never really included amongst the Zoophytes, the Sertularians had been removed from the Alcyonians, and the distinctions which exist between the Hydroida and Polyzoa as soon as perceived were carefully examined and defined." Grant, who in 1827 read a paper before the Wernerian Society on the "Structure of the Flustra," called attention to the differences which existed between the polyps of this family and the avicularia of the Sertularidæ, but from his arguments there does not appear any unreasonableness in concluding that he had never undertaken any examination or investigation of the structure of the intestinal system of the former. Independently of Grant, Audouin and Milne-Eduards likewise investigated the structure of the Flustridæ and published the results, while J. V. Thompson, at the time following up his investigations of the fauna of the coast of Ireland, published a complete description of the economy of the polyps of *Bowerbankia*, *Valkeria cuscuta*, etc., which he termed "*polyzoa*," and of which individual specimens have furnished favourable opportunities for the advancement of our knowledge on the structure of the polyzoa.

Earlier (1834) Erhenberg had made public the results of his examination of the Corals of the Red Sea, separating the polyps into "*Anthozoa*" and "*Bryozoa*," which latter are synonymous with the Polyzoa, and by which term all the non-hydroid zoophytes are now known.

Since then, time has added to the number of species, and also to the general knowledge on the subject, enlisting further workers into the ranks of the investigators of this interesting section of natural history.

In 1834 Lester wrote his "Observations on the Structure and functions of the Tubular and Cellular Polypi," followed in 1838 by Johnson's valuable treatise on the "British Zoophytes," which latter work was only superseded by the publication of the results of the elaborate labours of Hincks and Allman.

Amongst these may be mentioned Sars Louven, Couch, Van Beneden, &c. The latter published "*Recherches sur les Polypes Bryzoaires de la mer du Nord*" in the "Bulletin Academie Royal de Belge, 1849," "*Recherches sur les Bryozaires qui habitenl la côte d'Ostende*," 3 parts, "Mem. Academie Royal Belge, 1844-5," and "*Recherches sur les Bryozaires fluviatiles de Belge*," ibid 1847.

Busk also published a catalogue and many papers bearing on the subject, while the "Challenger Reports" may be considered as the works which bring the literature on the subject up to date. Within the last two decades, however, the study which has been devoted to "*Zoophytes*" has increased vastly our knowledge of their structure and arrangement of the various organs, resulting in the revision of the classification adopted by the earlier naturalists, for classification is the dependent of morphological investigation, and with the additional knowledge such investigations have assisted us to, the older classification must of necessity be revised.

Chief amongst those who have striven to raise these organisms from the very low type of life they were considered to represent in the scale of nature, and by their patient labours have demonstrated these animals to possess a higher differentiated structure than was suspected are, besides Allman, Hincks, Huxley, Green, P. H. Gosse, Nitsche and Smitt (F. H.), the latter having made certain families, viz., the Cyclostomata, the Ctenostomata, and the Cheilostomata, a special study.

Both Hydroida and Polyzoa were now classed under the sub-kingdom—the Polyzoa having now been eliminated and arranged under the Mollusca—Cœlenterata, *i.e.*, hollow-bodied animals, while it now includes those animals possessing a more or less radiate structure, "in which the alimentary canal communicates with the general or somatic cavity; they are furnished with tentacles which are armed with stinging cells or *cnerda*."

(To be continued.)

SOCIAL GROUPS AND ADAPTIVE CHARACTERS IN THE BRYOPHYTA.

By J. A. WHELDON, F.L.S.

(Continued from page 132).

In bleak and wind-swept localities, such as the Hepatic Formation described by Mr. Macvicar,[10] and on mountain scree slopes or maritime sand-dunes, the mosses grow in flat extended patches, immersed up to the apex of the stem in soil. When recently examining such tufts of *Tortula arenicola*, *Barbula rubella*, and *Brachythecium albicans* on the Freshfield sand-dunes, with Professor Weiss, he very aptly compared them with icebergs, having their greatest portion submerged. On the wind-swept summit of Ingleboro *Dicranodontium longirostre var. alpinus*, and on Greygarth Fell *Dicranum scoparium var. turfosum*, form very extensive patches in which only a few of the uppermost leaves are exposed to the wind, the greater part of the stems being sunk below the surface of the ground.

The leaves of some mosses are protected from erosion, by wind or water, by a thickening of the borders and nerve. In very rapid streams, however, even *Cinclidotus fontinaloides*, well equipped as it is with this armature, comes to grief, and on some tufts every leaf is deeply eroded. The figure of *Cinclidotus pachyloma* (Fig. 31, after Mr. Salmon's original drawing), admirably expresses the massive protective border and nerve developed by that species.[18] Other species, as *Octodiceras Julianum* and species of *Fontinalis* attain the same end by the flaccid and yielding nature of their stems and leaves.

D. The Sporophyte or sexless generation results from the fertilisation of an egg cell borne by the gametophyte. In all the Bryophyta the flowering arrangements are fundamentally similar. The male or antheridium gives birth to two-tailed motile spermatozoids, which are water-borne to the female, or archegonium. The antheridia are frequently seated amongst numerous paraphyses, and surrounded by perigonial bracts,

which assist in keeping them moist. The margins of these bracts have been observed in *Funaria* to develop a remarkable row of large lunate cells, adapted for water storage. When the archegonium is receptive, in the presence of moisture, a central core of mucilage cells becomes dissolved, forming a hollow tube from apex to base. The dissolved mucilage exercises a special attractive influence on the spermatozoids, one or more of which enter and find their way down to the ovum, which they fertilise. Immediately afterwards the sporophyte commences to develop. When the perigynia are terminal, young branches of the sporophyte frequently arise beneath them, and these form a protecting shield to the young sporogone against cold or drying winds. In the Hepatics, the calyptra is not ruptured until the spores are ripe. When the sporogone bursts through, the cells of the seta lengthen with great rapidity, in some cases attaining a length of several inches in a few hours. The tissues are delicate and not chlorophyllose, and they soon perish. In the mosses the young sporogone is very immature when it ruptures the calyptra, a portion of which is carried up as a veil or hood which affords protection to the growing capsule. In *Polytrichum*, a highly specialised moss, the capsule is densely hairy, forming a kind of thatched roof over the young fruit. The sporophyte is commonly regarded as the fruit of the moss plant, but it bears no analogy to the products of higher plants which go under that name. It is in reality a distinct individual remaining parasitic upon the parent gametophore, and completing its existence without becoming free. These plants, therefore, exhibit the somewhat rare phenomenon of a distinct alternation of generations.

The sporophyte is attached to the gametophore by a foot, which may be likened to the haustorium of the higher parasitic plants. This foot is sunk in the stem of the gametophore and and absorbs nutriment from it, and there is a thin conducting tissue leading through the seta, from the foot to the capsule. The sporophyte of the moss plant, therefore, needs no leaves,

and is less variable than is the gametophore, and its tissues are denser and more stratified. On this account stomata are frequently developed, especially about the lower half of the capsule where much assimilative tissue is massed. But as compared with the non-parasitic sporophyte of the ferns its assimilative tissue is reduced and little specialised. In the Hepaticæ the structure is still more simple, and because of having the protection of the calyptra until maturity, the tissues are laxer and stomata absent. This, of course, does not apply to the Anthocerotaceæ, which some separate as a distinct family.

Inside the mouth of the moss capsule is a fringe of teeth, known as the peristome. It is impossible in the present state of our knowledge to discover what special utility all the minute and wonderful variations of this beautiful fringe can have in the economy of the plant. It is usually strongly hygroscopic, and is supposed by Campbell[12] to assist in pushing off the lid when the spores are ripe. The peristome then closes the orifice of the capsule, and remains inflexed during wet weather. When drier conditions prevail, it becomes erect, and sometimes spreading, or even reflexed, often carrying with it masses of spores and aiding in their dispersal. In the hepatics dispersal is assisted by the movements of elaters, which do not occur in the mosses.

The spores are shaken out by the wind, which takes a prominent share in their distribution. In the majority of cases their great number and small size specially adapts them for conveyance by this agency. In a few genera they are, however, larger and fewer. These are mostly plants of humble stature, with short setæ, such as *Archidium* and some of the *Phascaceæ* and *Pottiaceæ*, which often grow amongst taller herbage; and they are probably scattered by the operations of husbandry, and by the soil adhering to the feet of animals or birds. Mr. Dixon has pointed out that large spores are correlated with an absent or very simple peristome.[15] In all the mosses the capsule is at

first erect, but in many species, as the spores approach maturity, the seta curves over, until the urn is inclined or even inverted, and this no doubt aids in scattering the spores.

But little is known as to the length of time during which the latter will retain their vitality. Probably but for a very short time in those which are furnished with a thin epispore, and for a rather longer period in those in which this covering is thicker. It is, however, very unlikely that any spores will retain their vitality in the ground for the long periods which some seeds of the higher plants are reputed to do.

It is very singular how such rare forms as some of the *Splachnaceæ* reach the special matrices to which most of them are restricted. These mosses grow on animal remains, and some of them are particular to those of carnivorous, and others to those of herbivorous species. One, *Tayloria Rudolphiana*, grows on the droppings of birds of prey on tree branches! It is a noteworthy fact that the spores of *Pottia*, *Phascum*, *Acaulon*, *Nanomitrium*, *Ephemerum*, and some *Brya*, which as a rule do not require to travel far before finding a suitable habitat, range from 20 to 40*u*. in diameter, whereas those of *Buxbaumia aphylla*, more or less parasitic on vegetable remains, only measure 3*u*, and those of *Tetraplodon mnioides* only 8 or 9*u*. This lightness enables them to be readily carried by the wind until some of them reach a proper nidus, which in the case of the last named moss would be the remains of a dead sheep. They also produce large quantities of spores. On a tuft of *Tetraplodon* which Mr. A. Wilson and I collected in Glen Eunach, about the size of a sixpence, 120 capsules were counted, each of which was estimated to contain about 2,000 spores. This small tuft, therefore, yielded in all probability at least a quarter of a million chances for the species to propagate itself, and as the moss usually grows in much larger patches, there seems to be abundant provision made for its necessities, notwithstanding the limited and precarious supply of habitats suitable to its requirements.

That spores must occur floating in the air at all times is proved by the rapidity with which denuded spots, abandoned quarries, and new walls become clothed with moss. The sudden appearance of many species at considerable distances from their headquarters, not only on the ground, but on rocks and roofs of houses, shows there can be no question of their having lain dormant in the soil.

Mr. Dixon instances the occurrence of young plants of the more or less montane *Rhacomitrium heterostichum*, *R. fasciculare*, and *Ptychomitrium polyphyllum* on hewn sandstone at Kingsthorpe in Northamptonshire. The nearest station for these species was 30 or 40 miles distant. They were, no doubt, wind-borne and soon disappeared. During 1903 *Bryum calophyllum*, and some of its associates from the Bryum group of the Lancashire coast, appeared in great quantities in damp hollows resulting from railway alterations near Wallasey in Cheshire. They had not previously been known to occur in the latter county, and in recording them I suggested that the spores had been carried from the Southport district by gales.[19] It is not impossible that *Amblyodon dealbatus*, *Meesia uliginosa*, and *Catoscopium nigritum* have also been introduced on the Southport coast by wind-borne spores, from their distant alpine homes; and even *Bryum neodamense* may have been brought in a similar manner. Mr. W. E. Nicholson has noted the occurrence of certain montane rupestral *Grimmiaceæ* on slate roofs in Sussex, which probably reached there from more natural habitats in Norway or the West of England, and Mr. Dixon found similar immigrants on sarson stones called the Grey Wethers in Wiltshire.

The two sexes do not always occur on the same gametophyte. In England, for instance, *Catharinea crispa*, a familiar moss in Lancashire cloughs, yields male "flowers" only. The result of this separation of the sexes is, that in a large number of species the sporophyte is very rarely produced, and in some quite unknown. Amongst British species placed in the last

category are *Ditrichum zonatum*, *Campylopus Schwarzii*, *C. atrovirens*, *Grimmia Stirtoni*, *G. robusta*, *Barbula cordata*, *Leptodontium gemmasceus*, *L. recurvifolium*, *Bryum Dixoni*, *Fontinalis Dixoni*, *F. seriata*, *Porotrichum angustifolium*, *Thuidium hystricosum*, *Myurium hebridarum*, *Amblystegium curvicaule*, *Hypnum sulcatum*, and *Hypnum turgescens*.

Still more singular is the fact that fruit is occasionally found on dioicous plants, in districts in which the male has never been detected. For example, *Paludella squarrosa* bears fruit in Bohemia, but the nearest locality for male plants is the North Tyrol. As it seemed impossible for the short-lived spermatozoids to be carried so far, Kerner[17] suggested that the sporogones originated by parthenogenesis, and gave other instances of reproduction by this unusual method in *Aulacomnium turgidum*, *Zygodon Mougeotti*, *Pterogonium gracile*, *Hylocomium rugosum*, *Thuidium tamariscinum*, and *Grimmia Hartmanni*. As the male organs of generation are very minute, there is always the possibility that they may occur sparingly, and still be overlooked. An alternative supposition is that under some conditions, especially in the presence of an excess of moisture, antheridia and archegonia are convertible into each other. If it could be proved that the sex of the moss flower was a mere question of adaptation to local conditions, the status of many "species" would be severely shaken. It is notorious that this character alone can be relied on to separate some nearly allied plants, as, for instance, *Bryum pseudo-triquetrum* and *B. bimum*. Ernest de Bergevin found in the flowers of *Plagiothecium sylvaticum* that under some conditions the archegonia were actually converted into antheridia,[20] and he figures examples showing the organs in all stages of transformation.

The sporophyte exhibits very little variation, and local conditions of environment do not appear to affect it to so great an extent as in the case of the gametophore, and therefore characters of the greatest taxonomic importance are derived from it. There is, of course, great structural difference between

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the stemless capsule of *Riccia*, immersed in the frond with no distinct assimilating tissue, and the highly developed sporogone of *Polytrichum*, with its various adaptations to meet totally different conditions ; and between these two extremes are innumerable gradations. But as we now find them, each seems to maintain its characteristics with much greater permanence than is the case with those of the gametophore. Whether a capsule is fitted with a subulate or a conical beak seems to be a matter quite independent of local conditions, as also whether the seta shall be papillose or smooth. I have been unable to trace any special adaptive reason for the varying length of the lid, the immense diversity in the peristome, or the presence or absence of papillæ on the setæ. Taking the British species of *Eurynchium* and *Brachythecium* together, it wlll be found that 23 have the seta smooth, and 21 have it more or less rough. Starting with the assumption that the papillæ might possibly be a xerophytic device, a long series of specimens of *Brachythecium rutabulum* were examined, from a great variety of situations. In these plants the length of the setæ varied from 12 to 30mm., and the number and density of the papillæ was found to be quite independent of the length of the seta, and degree of moisture or shade, of the habitat.

The length of the seta and the size of the capsule seems to be very erratic in some species, and these appear to constitute the chief characters which exhibit variability in the sporophyte. Hence varieties depending upon them, such as *Polytrichum nanum var. longisetum*, *Webera nutans var. longiseta*, and *Brachythecium rutabulum var. longiseta*, and some others, would perhaps be better regarded as mere forms, especially as many intermediate states are found connecting them with the more typical plant. Similarly *Dicranella cerviculata var. pusilla*, *Funaria hygrometrica var. calvescens*, *Meesia trichoides var. minor*, *Leptobryum pyriforme var. minus*, *Webera polymorpha var. brachycarpa*, *Bryum pendulum var. compactum*, *Bryum pseudo-triquetrum var. compactum*, and *Bryum capillare var.*

macrocarpum, are separated on characters which are extremely variable in many other species, and would probably all be better ranked as forms rather than varieties; and from evidence adduced by Mr. Dixon, the much debated *Hypnum canariense* could with propriety be regarded as a mere form of *Hypnum cupressiforme*, depending as it does chiefly on the relative length of the capsule.[21]

Hitherto but scant attention has been paid to the ecology of these plants. This somewhat sketchy outline of a wide and fascinating field of study is admittedly very imperfect; to have treated it more fully would have rendered it too bulky for these pages. But it is hoped that sufficient has been said to arouse interest in the study of mosses in the field rather than in the herbarium, and to induce bryologists to pay some attention to the manner in which they respond to varying conditions of environment.

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REFERENCES.

1. Wheldon & Wilson "Flora of West Lancashire," 1907.
2. ,, ,, "Inverness-shire Cryptogam," *Journ. Bot.*, 1908.
3. W. and G. S. West "Ecology of the Upper Drwa Valley and the Doorefjeld," *New Phytologist*, 1910.
4. W. G. Travis "Plant Remains in Peat in the Shirdley Hall Sand." *Trans.* Liverpool Bot. Soc., I., 1909.
5. J. A. Wheldon "Flora of the Manx Curraghs," *Lancs. Naturalist*, 1910.
6. ,, ,, "Marrat's Collection of British Mosses," *Journ. Bot.*, 1910.
7. —M. B. Slater "Mosses and Hepatics of the North Riding of Yorkshire," 1906.

8. A. R. Horwood "The Cryptogamic Flora of Leicestershire," 1909.
9. F. Cavers "Contribution to the Biology of the Hepaticæ," 1904.
10. Symers M. Macvicar "The Distribution of Hepaticæ in Scotland." *Trans.* Edin. Bot. Soc., 1910.
11. H. N. Dixon "Student's Handbook of British Mosses," 1904.
12. D. H. Campbell "Structure and Development of Mosses and Ferns," 1895.
13. R. Braithwaite "The British Moss Flora."
14. K. Goebel "Archegoniatenstudien," *Flora*, 1892-3.
15. H. N. Dixon "Moss Flora of Northamptonshire." Journal of Norfolk Nat. Hist. Soc., 1899.
16. ,, "Contribution to the Bryology of Tornean Lapland." *Revue Bryologique*, 1901.
17. A. Kerner "Natural History of Plants." Eng. Trans. by Oliver, 1895.
18. E. S. Salmon "Bryological Notes." *Revue Bryologique*, 1900.
19. J. A. Wheldon "The Mosses of Cheshire." *Journ. Bot.*, 1904.
20. E. de Bergevin "*Interversion dans la croissance des organs sexuelles.*" *Revue Bryologique*, 1902.
21. H. N. Dixon "*Hypnum canariense* and *H. circinale*," *ibid.* 1899.

LIVERPOOL GEOLOGICAL SOCIETY.

A field meeting was held on the 8th July, at Billinge, under the leadership of Mr. C. H. Cox, B.Sc., to examine the exposures of Lower and Middle Coal Measure strata which occur in that district. The ascent to Billinge Beacon was made, from which point the leader described the geological and geographical features presented in the fine panorama. The ridge formed by Billinge Beacon and its extension is due to an upthrow of Lower Coal Measures rocks by which the Wigan coalfield has been broken into an eastern and western portion, the line of dislocation being along the Great Upholland Fault, by which a displacement of strata for over 2,000 feet has taken place. The quarries at the top of the hill are situated in the upper part of the Gannister Beds, and consist of thick-bedded flagstones, some of which are used for the making of grindstones, etc. The chief feature of geological interest in the quarries lies in the enormous concretions and markings on the surface of the beds. After being entertained by Mr. and Mrs. Cox at Upholland Grammar School, an interesting section of Middle Coal Measures was examined near the station, and numerous specimens of fossils were obtained.

On the 15th July the members of the Manchester Field Naturalists, under the leadership of Mr. John Cantrell, visited Silverdale. Following on a morning shower the rest of the day was delightfully fine. Through Silverdale Woods the party proceeded along the shore of Morecambe Bay, up and over Warton Crags, to Carnforth. During a halt by the way the leader described the points of interest, and the geological formation of the locality was the source of much interest. At a later halt extracts were read from Mr. J. Wilfrid Jackson's work on the exploration of the Dog Holes Cave. Later an inspection of Warton Church was made. The botanical aspect of the ramble will be found on another page.

LOCAL MAMMALS.

Mr. Fredk. J. Stubbs recently delivered an address on "Local Mammals" to the members of the United Field Naturalists. Some people, he said, when speaking about many things used the term animal, but when animals were spoken of they generally meant the four-footed, warm-blooded beasts. Naturalists generally spoke of them as mammals. At one time mammals were more important in England than birds; people fed on them. They killed and ate wild boars in that district once, but they were exterminated. He wished to speak of the smaller mammals. Shakespeare once spoke of rats, mice, and small deer. Deer originally meant any animal, but that name was now changed. Some years ago he wrote a list of the mammals in that district, and he got 39 names down. If his audience thought of the natives of that district, say for about 10 miles, they would not go beyond half-a-dozen or ten. Mammals were such an important form of life in England that they had about 89 altogether on their lists. If they wanted to catch them they had to trap them, but sometimes when standing about the fields they were lucky enough to see inside their life. If they were interested in natural history, they would find the study of mammals a good second string. Speaking of bats, Mr. Stubbs described the difference between a bat and a bird. Some people said that bats fluttered into their faces. He had made a study of bats and had watched them at close quarters, but none had ever fluttered into his face, nor had one ever touched him when he had disturbed them. The bat possessed marvellous powers of flight—immeasurably superior to that of any bird. The great horse-shoe bat was common in the South of England. Then there was the long-eared bat, possessing a very curious voice; the small Whiskered bat, the Noctule, which was eleven inches across the wing; the Leisler's bat, one of the rarer sort, a capture of which had not been recorded in Lancashire (Mr. Stubbs caught the second recorded for Cheshire; the Natterer's (caught at Red Bank), which was a

curious bat with a white breast; and the Daubenton's bat, recognised because of its curious flight over the water. It always kept at the same level, near the water. Some bats would dip into the water like swallows, and others would swim in the water.

Shrews were next dealt with. The little shrew did not live in captivity very long. It was like a mouse, but had a long nose. There was the common shrew, the lesser shrew, which was the smallest mammal in England, and was found on the moors. There was also the shrew which had been found in the stream between Broadbottom and Stalybridge. It was an aquatic animal like the otter and a dreadful cannibal. The common shrew was probably the most abundant mammal in Great Britain. Cats would kill them but not eat them. Owls would kill and eat them. He had a tame hawk at home, and they used to have a lot of mice, and the hawk used to eat plenty. One day they got a shrew in the box, and it was taken to the kestrel, who promptly pulled it to pieces and swallowed it. A short time afterwards it came back, and when offered a mouse a few minutes later the kestrel was suspicious for the first time in its life. It was possible to state the species of any mammal by examining its teeth and bones. An example of a full-grown lesser shrew which had been found in Hodge Gardens was handed to Mr. Stubbs, who spoke about it. Shrews died in June and July, and could many times be found on the paths through fields. Lionel Adams said that shrews were annuals. Born in the spring of the year they reached maturity in the following spring, and died after the breeding season—died from old age at 15 months. There were difficulties about that theory.

The mole had very powerful fore limbs. It burrowed burrowed through the ground at a terrific speed, and for its size was the hardest-working animal in the world. It was astonishing to watch the way it worked. There were no moles in Ireland, in fact a lot of British mammals were not found in Ireland. Some people said moles were blind, but he did not

believe it. He once watched a mole he had in his garden, and he could not believe it was blind, judging by the way it went about, so quickly did it move. Some European moles were entirely blind. They were greedy little things, but well worth studying.

The hedgehogs or urchins were common in the district and were native to Oldham Park. They escaped observation, for being nocturnal they were shy little things. Shakespeare called them hedgepigs. The naturalists' books told them that the name "urchin" was extinct in England, but it was not extinct in their district. They found them mentioned in old churchwardens' accounts. They used to pay so much per head to their captor. In an old book they found that the hedgehogs left the fields and went into Oldham streets to look for water.

The fox was not extinct locally, but nearly so. Some time ago they used to kill them on the moors, but now in some parts of England they were protected for sporting purposes, and to kill a fox in some districts was a great social crime. At one time they were common, but now they were going out. Some keepers boasted how many foxes they had killed. The badger had gone. There used to be a certain amount of badger-baiting at one of the little public-houses in an out-of-the-way district in that locality. They got three barrels, put them together, and then a charge was made per head for the terrier. If it was a terrier it would bring the badger out, but if the dog was afraid and the badger got one bite in with its jaw it was the end of the dog. It was a powerful creature and very common in the South of England. The otter was practically extinct. Some years ago he had particulars of two being caught in a gasholder at Disley, but they died; and also of one being in Stockport Museum. One read of an otter hunt in Northmoor, Oldham. Leo Grindon talked about a seal in the Irk. Probably it was only an otter. They must remember that the common seal had been caught well up the Mersey, and in the Wash they were common. They had knowledge that the great grey seal would reach nine feet and was a common mammal on the British coast.

The polecat was extinct. It was formerly good sport, but about 20 or 30 years ago it became suddenly extinct. The ferret was the domesticated polecat, and there were the stoat and the weasel. Both were dreadfully bloodthirsty things and did a lot of damage. He had seen both stoat and weasel on Fitton Hill, and last July he had seen a weasel carrying its young in its mouth like a cat. It dropped it when he approached and did not come back for it. The common mouse was not English. It was imported from the East. The wood mouse was common. There was the common vole, the common red bank vole, the water vole, commonly known as the water rat. A species of hare called the Alpine hare was common on the moors. It was introduced in 1862 by some members of the Lees family, of Greenfield, and had reached Macclesfield and Sheffield and was swarming all over the moors. It was said to be driving out the native. The squirrel was extinct and the deer gone.

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THE NEW SADDLEWORTH SOCIETY.

The members of the Saddleworth Literary and Philosophical Society on July 15th visited the valley of Castleshaw. The old Bakestone pits were explored, and then a move was made up the river side until the ancient bloomery was reached, which was explained by the local antiquarian, Mr. A. Wrigley. Later on the Roman camp was visited, and described by one of the owners of the site, Major Lees, of Heywood. After tea at Spring House a meeting was held, at which Mr. Brandon T. Brierley, the president, delivered an address on the history and geology of the district. Mr. Charles Shaw, of Delph, also described the botanical specimens found on the way. This first excursion was a decided success, and since it was started the Society has made great progress.

ITEMS OF INTEREST.

Reports from Piel stated that sharks had been seen in Morecambe Bay, and when the stake nets on Foulney Island bed had been "fished" thirty-two sharks were in the nets, the smallest being over 30lb. in weight.

On July 8th the members of the Botany Class connected with the Manchester School of Technology revisited West Timperley and the Ballast Hole, Mr. H. Hyde dealing with the characteristic plants found, dealing with their structure and habits. Besides the many marsh plants, the London Rocket was found on a refuse heap, with the common yellow melilot. On the succeeding Saturday, through the kind offices of Mr. T. Smith, of Alderley, the grounds of Mr. J. W. Crewdson, of Endsleigh, Alderley Edge, were visited, and Mr. Whitney, the gardener, displayed the glories of the rose gardens and the water plants which find a congenial home here. Then the garden of Mr. Smith was visited, and on Alderley Edge were obtained the bladder campion, centaury, and helleborine.

On July 8th, the members of the Manchester Microscopical Society, under the leadership of Mr. Charles Turner, visited the Plumbley district, and much interesting work was done in the Cheshire ponds. Phantom larvæ were immediately secured, and on a thick piece of submerged root one of the members discovered a fine colony of *Plumatella repens*. Tubes were in great demand, and many remarkable polyps were transferred to them, so that later on a good fund of instruction will accrue. Water fleas, bearing upon their backs a forest of bell animalcules, hopped about merrily in the water. Four species of Desmids were found, and a piece of starwort yielded a large quantity of *Coleochæte orbicularis*.

In the *Millgate Monthly* for August, Dr. W. E. A. Axon has an article on the Death's Head Moth. In the main it follows out the information given by Mr. R. Standen in the extended article upon the same moth that has just concluded in our pages. There is an excellent illustration of a specimen captured at Bowdon, Mr. J. Wilfrid Jackson's photograph betraying his usual skilful work. In the same number is an article on coast erosion. This deals more particularly with cause and remedy. Little is said in the text of the County Palatine, but there are two illustrations showing the effects of erosion on the coast near Blackpool.

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Jungermannia sphærocarpa Hook. *var. lurida* (Dum.) in Westmorland.

Neither in the late George Stabler's "Hepaticæ and Musci of Westmorland" (1898) nor in Mr. Macvicar's "Census Catalogue of Hepatics" (1905) are either the type or variety recorded. Amongst a collection of Hepaticæ made in the Troutbeck Valley, July, 1899, I find specimens of the variety *lurida* which I collected on a clayey bank at about 1,500 feet on Ill Bell. I might call it an intermediate form between the type found at a low elevation, and the variety found in sub-alpine and alpine situations. It has the more prostrate habit and darker colour than the type, but not so distinctly marked as in specimens received from Wales and Scotland.

W. H. Pearson.

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The Development of the Snipe.

In the *Zoologist* Mr. F. J. Stubbs has completed a paper on the "Development of the Snipe," in which, after following out the literature devoted to the species, he makes a fairly lengthy comparison between the Jack Snipe and the Common Snipe. "No one can deny," writes Mr. Stubbs, "that these two Snipe resemble one another very closely to all except expert eyes. I should think that few outside the ranks of sportsmen and professed ornithologists could state offhand the difference between the two birds, and I have a vivid recollection of the time when I could not always be certain, although handling the birds and seeing them in the fields. It is now easy to recollect that if the bird has any cross-barred feathers it is a Common Snipe, while if all are longitudinally streaked it is a Jack. . . As a matter of fact, there must be hardly a bone or a single feather that is not different to the corresponding bone or feather in the other species." The paper especially appeals to our readers, for Mr. Stubbs' observations must largely have been made within our own radius.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

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There has been recently added to the Natural History Museum at Buile Hill Park upwards of one hundred and sixty beautiful photographs of British wayside flowering plants, in addition to about sixty of the grasses to be found in the country round Salford and Manchester. These are all classified, and bear, with the popular and scientific names, an indication of the general colour of the flower, and the situation and the kind of soil or surroundings in which the plant is usually to be found.

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The Death's Head Moth.

On the open evening at the Manchester Museum, on August 2nd, Mr. R. Standen discoursed, to an appreciative audience, on the Death's Head Moth *(Acherontia atropos)*, dealing exhaustively with the life-history, geographical distribution, migration, hive-robbing propensities, superstitions, and general folklore relating to this peculiar insect. The lecture was admirably illustrated by the exhibition of the Museum collection of specimens of the moth, photographs, and preserved examples of the larva, from various English localities —including a number of local captures recently recorded in the pages of this Journal — the Continent, Ceylon, and Sierra Leone. Examples of *Acherontia lachesis*, *A. marta*, and other allied exotic species were also shown for comparison. In the discussion which followed, a gentleman in the audience related an instance, which had come under his personal observation, of a Death's Head, which had penetrated into a beehive near Birmingham, being stung to death by the bees, and then entombed by them in a coating of wax.

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The August *Naturalist* contains an article by A. Haigh Lumby on "The Birds of Walney Island."

LIVERPOOL GEOLOGICAL SOCIETY.

A visit to Rochdale had been arranged for August 5th, under the leadership of Mr. W. A. Parker, F.G.S. (Rochdale), for the purpose of examining the well-known section of Middle Coal Measures strata exposed in Sparth Bottoms. The heavy rains during the morning had a prejudicial effect on the attendance, and only a few members ventured to make the journey. On arrival, they were met by Mr. Parker and Mr. W. H. Sutcliffe, F.G.S., who conducted them to the pit, where the former gentleman pointed out the fossiliferous zones, and gave a description of the rare specimens of Carboniferous crustacea, etc., which the section had yielded. Unfortunately the weather conditions did not permit of a prolonged stay ; and although there was much hammering by the party, reinforced by Mr. S. S. Platt, F.G.S., little beyond the characteristic plant-remains rewarded their exertions. Mr. Parker, however, made generous amends by presenting specimens from his own collection. An adjournment was made to the Museum, where the party was met by the Curator, Mr. F. Williamson, and the excellent collection of fossils, erratics, minerals, and worked flints from the neighbourhood was inspected. After enjoying the hospitality of Mr. Sutcliffe, the visitors returned to Liverpool, well satisfied with the day's excursion, and pleased to have made the acquaintance of their Rochdale brother-geologists.

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On July 22nd the Lancashire and Cheshire Antiquarian Society visited Lyme Hall, by kind permission of Lord Newton, and they thoroughly enjoyed the old buildings, the ancient tapestry and armour, the elaborate carvings, and the multitude of good things which serve to transform the place into quite a treasure house of antiquities. The visit to this interesting old hall was much enjoyed.

The Quail Near Manchester.

In the *Manchester Evening News* "J.J.C." records the appearance of the Quail in the country round Manchester. "The first observation was on June 27th, in the low-lying river meadows of the Mersey. Since that date scarcely an evening has passed without one or more birds having been heard. So far no observations have come to hand beyond these river meadows. Now the hay meadows are cleared of their crop, and the birds are mostly lodged in the fields of corn—the same fields in which they were found during the famous quail summer of 1893. The curious thing is that the visitor has not been observed much earlier in the season. It seems to have just arrived, and in some numbers. Yet we can hardly imagine that its arrival for the summer is so belated. The quail comes 'from the warm regions of Africa,' and is usually a spring visitor to our land. In the South of England it breeds regularly each year, but in the North it is more or less occasional and rare." He deals with the quail invasions from time to time. "The year 1870 is noted in this respect, and also the year 1885. On these occasions the quail was abundant in most parts of Great Britain. . . . Between 1893 and the present summer the writer has only on two occasions met with the quail near Manchester. In 1894 a solitary bird was heard calling in a field at Baguley, and in July, 1900, four or five were noted more than once in a spot near Wilmslow."

On July 26th, the members of the Manchester Field Naturalists visited Gatley, under the leadership of Mr. W. Hope. Proceeding by way of Gatley Carrs and by fields to Sharston and near to the hamlet of Poundswick, return was made through Cross Acres. At Gatley attention was drawn to Stone Pale Hall, and Mr. J. D. Andrew had something interesting to say about it. The chief botanical find was *Impatiens parviflora*, which grows by the brook in Gatley Carrs.

LIVERPOOL BOTANICAL SOCIETY.

The third field meeting of the session was held on Saturday, July 29th, when a joint excursion was made to Delamere in conjunction with the Chester Society of Natural Science. The meres hereabouts, which are supposed to have originated from the results of brine subsidencies in the Trias of the Cheshire Plain, afford excellent studies in plant ecology, and anticipations in this respect were fully realised. Flaxmere was first visited, under the guidance of Mr. J. Southworth, and some time was devoted to an examination of the bog flora of the locality. Insectivorous plants were well represented, five species being observed, viz.: *Drosera anglica*, *D. intermedia*, *D. rotundifolia*, *Utricularia minor*, and *Pinguicula vulgaris*. Several forms of Sphagna were found here, and the bramble. *Rubus Sprengelii*, was seen in some quantity. A number of interesting Desmids and other Microphyta were obtained in the peaty pools. Considerable numbers of the handsome larvæ of the moth *Saturnia carpini* were found feeding on the heather. Hatchmere was next reached, and the prolific aquatic vegetation afforded further variety, including *Carex ampullacea*, *C paniculata*, *C. glaucum*, *Cladium Mariscus*, and many more interesting plants too numerous to particularise.

Mr. G. P. Miln (President of the Chester Society), delivered a short address after tea, and emphasised the value of occasional joint meetings of this character. He, in common with other members of the Chester Society, hoped that further meetings of this nature might be arranged in the future. From past experience members of both Societies had come to regard such joint meetings as being mutually advantageous. The return journey was made through Delamere Forest to Mouldsworth Station. An example of the variety *mite* of *Cirsium arvense* was found in a damp situation by Miss L. R. Cooke. Doubtless the diminished spinescence and distinct habit of this variety of a common species is not uncorrelated with the plant's environment.

THE RUFFORD EXCURSION.

On Saturday afternoon, July 22nd, an excursion was made to Rufford. The attendance of members was less than usual, owing to the holiday season. The weather was ideal, and the outing proved thoroughly enjoyable to those who took part in it. The chief feature of botanical interest to which attention was devoted was the hygrophilous vegetation of the swamps and ditches, and owing to the drought the marshy ground by the side of the railway was more accessible than usual. In these swamps there is a rich and luxuriant vegetation, which can be seen at its best towards the end of July, and several different types of marsh plant associations are represented. In places there is what may be called a *Typha* association composed almost entirely of both species of reed-mace, *Typha latifolia* and *T. angustifolia*. The latter, a more slender and graceful plant than its congener, and of rarer occurrence, occurs abundantly at Rufford. At other places, the Typha association gives place to a more general marsh vegetation, in which the following plants are conspicuous :—*Scirpus Tabernæmontani*, *Carex Pseudo-cyperus*, *Rumex Hydrolapatheum*, *Spiræa Ulmaria*, *Deschampsia cæspitosa*, *Solanum Dulcamara*, *Epilobium hirsutum*, *E. palustre*, *Œnanthe fistulosa*, *O. Phellandrium*, *Galium palustre var. Witheringii*, *Lysimachia Nummularia*, etc.

Myriophyllum verticillatum (flowering) was found in the stagnant water of a ditch. In all cases the bracts were found to be four in number, not five, as is commonly the case. *Butomus umbellatus* occurs sparingly, and was seen in flower. Some fine clumps of *Veronica Anagallis-aquatica* were noticed ; all the specimens of this examined had the racemes glandular, and consequently come under the *var. anagalliformis*.

After investigatiug the marshes, a pleasant walk was taken along the bank of the canal. The yellow water-lily (*Nymphæa lutea*) was found in plenty, and flowering. *Potamogeton perfoliatus* and *P. pectinatus* occur in dense submerged masses, and along with them is *Myriophyllum spicatum*. A conspicuous feature along the margin of the canal is the large clumps of *Glyceria aquatica*, a very fine aquatic grass, which was seen in its full beauty.

W.G.T.

LIVERPOOL BOTANICAL SOCIETY.

Prizes and Certificates for Botany and Nature Study.

The following are offered by the Liverpool Botanical Society to boys and girls residing in Lancashire and Cheshire.

The first prize in each case will be half-a-guinea, together with the Society's certificate.

Contributors not gaining a prize may be awarded certificates if of sufficient merit.

FOR SECONDARY AND PRIVATE SCHOOLS.

1. For the best account of the processes of absorption and excretion of water by a plant. This should be illustrated by sketches, and also, if possible, by descriptions of any experiments performed by the writer.
2. For the best set of six photographs, illustrative of the various stages of growth of any plant.
3. For the best account of the life history of one of the following, viz.: The Sycamore (Acer Pseudo-platanus); Red Campion (Lychnis dioica); Marsh Marigold (Caltha palustris); White Dead Nettle (Lamium album); Convolvulus; or the Furze (Ulex europæus).
4. The best description of the development of the flower, floral structure, and pollination of one of the following, viz.: Cow Parsnip (Heracleum Sphondylium); Dandelion (Taraxacum officinale); Garden Nasturtium (Tropæolum); or the Canterbury Bell (Campanula medium).
5. The best set of twelve drawings, paintings, or photographs, of representative sandhills plants.
6. The best nature diary, journal, or calendar. This must include observations taken during at least any four consecutive months of 1911. Competitors in this class must be under 14 years of age.

FOR PUBLIC ELEMENTARY SCHOOLS.

1. The best description of a series of observations on the plant life of a local park.
2. The best set of drawings (pen, pencil, or colour), illustrating growth of the potato, onion (or other bulb), and bean.
3. The best collection of fruits and seeds (accompanied by drawings) illustrating dispersal.
4. The best set of three colour drawings of twigs, flowers, or leaves. Must be worked in school from living specimens.
5. Best nature diary, journal, or calendar. Must include observations taken during at least any three consecutive months of 1911.

GENERAL CONDITIONS GOVERNING COMPETITIONS.

All competitors from Secondary Schools must be under the age of 18, and those from Elementary Schools under 15.

All essays, descriptions, drawings, etc., must be competitors' own work. It is desirable that assistance should be obtained from every available source, but mere copied or dictated work will be disqualified.

All drawings, exhibits, etc., must be received on or before Oct. 31st, 1911, at the Hartley Laboratories, Liverpool University, addressed, "Secretaries Liverpool Botanical Society."

All entries must be accompanied by a sealed letter, stating the full name and address, exact age, and school attended by, the competitor.

An exhibition of the work sent in for competition, and presentation of prizes and certificates, will be held early in December at the Hartley Laboratories.

Wayside Leaves.

At the last meeting of the Prestwich Society, Mr. Abraham Stansfield said that one of the deadliest enemies to horticulture was the motor-car, which had undoubtedly come to stay, which was just as certainly making gardening impossible in the near neighbourhood of our highways. He pleaded on behalf of his coadjutors for some mitigation, at least, of a nuisance which had become intolerable. Surely in this connection the resources of science were not exhausted.

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"The Prehistory of Wales" was the subject dealt with by Professor Boyd Dawkins at the annual meeting, on August 29th, of the Cambrian Archæological Association, of which he is this year the president. In this the Professor said that it was in the caves and cairns of Wales that he found his call to the study of the prehistory of that country, and Wales gave him the standards from which he had dealt with the successive civilisations and the sequence of races in the British Islands and in Western Europe.

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The Ancoats Brotherhood on a recent Sunday visited the Ribble Valley, but took the length which is not so extensively patronised as the other, and there was no cause for wonder that they found some of the stiles barred. They joined the river at Preston, and passing over the old tram bridge, went on to Walton-le-Dale. Here the riverside was gained again, and after a detour to Samlesbury for lunch, the party proceeded by way of Lower Hall, and then by the river to a country lane leading to Balderstone, and on to Mellor Brook. Climbing the heights from here the car at Billinge End was reached, and so on to Blackburn.

It is passing strange that the county town of Lancashire, of all other towns, should be without even a shadow of a thorough museum. This defect has been made more noticeable by the recent visit to the ancient town of the members of the Cumberland and Westmorland Antiquarian and Archæological Association. The proceedings of this body in themselves served to show the urgent need for such an institution. Rich in historical associations, and possessing a wealth of antiquities as revealed more and more by repeated excavations, it does seem a pity that some local institution could not be found wherein could be stored the treasures which are uncovered from time to time.

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Naturally the situation has induced correspondence, and in a letter to one of the Lancaster papers, one gentleman makes a forcible appeal for "a permanent home wherein to treasure the many local finds and relics of the past. . . In almost every town and city there is one public institution more sought after than another, and that is the 'public museum.' This is not confined to the older towns, but many places of comparatively new origin have really excellent museums. The museum proper is not intended alone as a storehouse of local antiquities, but also as a means of technical education and popularising local industries. Blackburn Museum has wonderful examples of textile productions and early calico printing; St. Helens, with its glass industries, has exhibits of Venetian beautiful antique glass; Derby, its priceless china museum; Birmingham, wrought iron exhibits, &c.; and it is needless to speak of the splendid museums of Preston and Carlisle." The writer goes on to ask that at least a loan museum be established for the winter months. At present they have nothing to show the outside visitors who throng the town in search of antiquities and historical associations beyond the Castle. Surely here is an opportunity for one benevolently inclined towards the town to render it a signal service.

Miss Alice Johnson threw open the fine collection of Roman pottery at Castle Park, Lancaster, on the occasion of the recent visit of Antiquarians, and the privilege was much appreciated by a large number of visitors.

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At a later period a visit was paid to the Old Hall at Heysham, where the find collection of furniture, china, and pewter made by Miss Royds was much admired. The hall itself dates from 1598.

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During the second week in August the Manchester Field Naturalists were entertained at that old Elizabethan mansion, Sale Hall, the residence of their president, Sir William H. Bailey. The occasion was a garden party, and the affair was thoroughly enjoyed.

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The fifteenth annual week's Fungus Foray in connection with the British Mycological Society is to be held at Taunton from the 18th to 23rd September, 1911. During the week the Society will explore the woods in the neighbourhood of Dunster, Staple Park, Triscombe Stone, and Buncombe Cross Roads, and the following lectures will be delivered:—"On the collection of specimens of Coprini," and "The Production and Liberation of Spores in the Genus Coprinus," by Professor A. H. R. Buller, D.Sc., Ph.D., F.R.S.C.; "European Fungi in the Tropics; some notes on existing records," by Mr. T. Petch, B.A., B.Sc.; "Our British Geasters," by Mr. Carleton Rea, B.C.L., M.A.; Mr. E. W. Swanton will give a popular lecture on Fungi; and the Presidential Address, "Economic Mycology, and some of its problems," will be delivered by Professor E. S. Salmon, F.L.S. The headquarters will be the Museum at Taunton Castle.

FOSSIL PLANTS.

Prof. F. E. Weiss, D.Sc., M.Sc., F.L.S., presided over the deliberations of the Botanical Section at the British Association Meeting at Portsmouth during September, and for his presidential address chose to treat of fossil plants, a subject in which he has taken a deep and lively interest. In his introduction he paid a tribute to the workers who had preceded him. "The great attractiveness of Palæobotany," he said, "and the very general interest which has been evinced in botanical circles in the progress of recent investigations into the structure of fossil plants, are due to the light they have thrown upon the relationship and the evolution of various groups of existing plants. It was the lasting achievement of Professor Williamson to have shown, with the active co-operation of many working-men naturalists from the Lancashire and Yorkshire coalfields, that the structure of the Coal Measure plants from these districts can be studied in microscopic preparations as effectively as has been the case with recent plants since the days of Grew and Malpighi. Indeed, had Sachs lived to continue his marvellous historical account of the rise of botanical knowledge up to the years 1880 or 1890, he would undoubtedly have drawn attention to the remarkable growth of our knowledge of extinct plants gained by Binney and Williamson from the plant remains in the calcareous nodules of English coal-seams, and by Renault from the siliceous pebbles of Autun. We are not likely to forget the pioneer work of these veterans. though since then investigations of similar concretions from the coal deposits of this and other countries have been undertaken by numerous workers, and have revealed further secrets from that vast store of information which lies buried at our feet.

A striking instance of the insufficiency of the evidence of external features alone was Professor Oliver's demonstration of the seed-bearing nature of certain fern-like plants, based on

microscopical comparison of the structure of the cupula of Lagenostoma, with the fronds of Lyginodendron, confirmatory evidence of which was speedily forthcoming from other workers.

The infectious enthusiasm aroused by the discovery of the seed-bearing habit of the Lyginodendreæ and the Medulloscæ had indeed carried all before it, and Prof. Weiss suggested that perhaps English Palæobotanists had not looked sufficiently into the foundations of the theory that these groups form the "missing links" between the Ferns and Cycads. He devoted considerable time to an examination of Professor Chodat's criticism of the wholesale acceptance of this view, and said that a reinvestigation of the whole question of the microsporangia of Lyginodendron seemed to him to be clearly called for by the publication of certain of Chodat's figures, while the criticism as a whole seemed sufficiently weighty to demand a careful reconsideration of the structure and affinities of this highly interesting group. Professor Weiss also suggested that some people had been too ready in their rapid acceptance of the Cycadoidean ancestry of the Angiosperms. It is not necessary, he argued, to fix on one group of ancestors for all existing Angiosperms. Indeed the great variety of forms, both of vegetative and reproductive organs, met with in this order of plants, not merely to-day, but even in the Cretaceous period, warrants, he thinks, the belief in their polyphyletic origin. In a later portion of his address, Prof. Weiss offered some interesting opinions as to the habitat of the Coal Measure plants. Broadly speaking, he said, coal may be considered as the accumulated material of palæozoic forests carbonised *in situ*, although in some cases coal deposits may be due to material drifted into large lake basins by river agency. Various considerations lead to the conclusion that these forests grew up in marshy and swampy conditions, and although some characteristics of the foliage of certain Coal Measure plants had suggested that they inhabited a salt marsh, he thought the stronger evidence pointed to fresh water rather than to marine

conditions. As to temperature, Professor Weiss said he thinks that Potonié is probably right in assuming a fairly warm climate for the Coal Measure forest, and the difficulty of accounting for a great thickness of humic or peat deposits in a high temperature is met to a large extent by Dr. Koorder's discovery of a swamp forest in Sumatra, which has produced a deposit of peat, in some places 30 feet in thickness. As to the great variety in the types of vegetation found in the coal seams, the advance of the fascinating study of ecology pointed, he thought, to a solution of the difficulty. Might not this mixture in types represent the transition from open swamp to fen or marsh, with plentiful peat formation, due to the gradual filling up of the stagnant water with plant remains? Thus in places at any rate a transition from aquatic to more terrestrial types of vegetation would take place, while the tree-like forms rooted in the deeper water would continue to flourish. The Coal Measure swamp in this stage would differ from the tropical swamp of Kooders by a more abundant undergrowth of herbaceous and climbing plants, rooted in deep humus and passing off gradually into drier peat. Such an undergrowth of Cryptogamic types, mainly Filicinean or Pteridospermic, would have admirable conditions for suitable development.

In commenting upon his belief that we had in the peat deposit of the coal-seam a succession of associations, Prof. Weiss considered we ought to find its growth and history recorded by the sequence of the plant-remains, very much as Mr. Lewis has discovered with such signal success in our Scottish peat-bogs. Some differences were noted by the Professor as borne out by Mr. Lomax, and he referred to a number of experiments conducted upon a series of nodules he had himself obtained from the Shore Pit, observations he intended to continue during the coming winter.

In concluding his address, Professor Weiss pleaded for intimate collaboration between all botanists, so that by united efforts and close co-operation could be surmounted the difficulties still confronting the science.

SOME NOTES ON THE HYDROZOA AND POLYZOA.

By Joseph Smith, M.R.I.A.,

Fellow of the Royal Society of Antiquaries, Ireland.

(Continued from page 154.)

This sub-kingdom is divided into Hydroida—"animals in which the wall of the digestive sac is not separated from that of the somatic cavity, and the organs of reproduction are external"; and secondly, into the Actinozoa, "animals in which the wall of the digestive sac is divided from the somatic cavity."

The class Hydrozoa was divided into three families, viz.:

I.—The Hydroida. Hydroid Zoophytes.

II.—The Siphonophora.

III.—The Discophora, or Lucernaridæ.

But the most comprehensive classification, which I give *in extenso*, is the one which has been adopted by Naturalists.

Class Hydrozoa.

Sub-Class I.—Scyphomedusæ (Syn, Ephyromedusæ).

Order I.—Lucernariæ.

Family I.—Eleutherocarpedæ.

Containing the Lucernaria and Haliclystus and

Family II.—Cleistocarpidæ,

in which we find the Craterolophus and Manania.

Order II.—Discornedusæ (Haeckel).

Sub-Order I.—Cubostomæ.

Family I.—Protephyridæ.

Family II.—Nausithoidæ.

Containing the Nausithæ.

Family III.—Ephyrellidæ.

Family IV.—Atollidæ.

Family V.—Cychorchidæ.

Sub-Order II.

Family I.—Pelagidæ.

Of which Chrysaora and Pelagia are members.

Family II.—CYANÆIDÆ.
Family III.—STHENONIDÆ.
Family IV.—AURELIDÆ.

Sub-Order III.—RHIZOSTOMÆ.
Family I.—TETRAGAMELLIÆ.
Containing the Cephea and Cassiopeia.
Family II.—MONOGAMELIÆ.
Claiming the Rhizostoma and Crambessa.

Order III.—CONOMEDUSÆ (Haeckel).
Family I.—CHARYBDEIDÆ.
Family II.—BURSARIDÆ.
Family III.—CHIROPSALMIDÆ.
Order IV.—PEROMEDUSÆ (Haeckel).
Family I.—PERIPHYLLIDÆ.
Family II.—PERICRYPTIDÆ.
Sub-Class II.—HYDROMEDUSÆ.

Order I.—GYMNOBLASTEA = ANTHROMEDUSÆ.
Family I.—TUBULARIDÆ.
Containing Tubularidæ, Hybocodon, and Corymorpha.
Family II,—PENNARIDÆ.
Of which Pennaria and Vorticlava are members.
Family III.—EUDENDRIDÆ.
Claiming Bougainvillia, Perigonium, and Lizzia.
Family IV.—CLADONEMIDÆ.
Numbering the Cladonema, Clavatella.
Family V.—BIRNERIDÆ.
Containing Garveia and Stylactis.
Family VI.—DICORYNIDÆ.
Entirely represented by the Dicoryne.
Family VII.—CORYNIDÆ.
Containing the Sarsiadæ, the Sycoryne, and Coryne.
Family VIII.—HYDRACTINIDÆ.
Represented by the Hydractinia and Prodocoryne.

Family IX.—CLAVIDÆ.
Made up of Clava turris and Cordolophora.
And
Family X.—HYDRIDÆ.
Of which the well-known Hydra and Protohydra are the members.

Order II.—CALYPTOBLASTEA—Leptomedusæ.
This Order is made up of five Families.

Family I.—PLUMULARIDÆ.
Containing the interesting Plumularia and Antennularia.
Family II.—SERTULARIDÆ.
Numbering the Sertularia and Halecium.
Family III.—THE CAMPANULARIDÆ.
Of which the interesting Campanularia, Eucopedæ, Laomedia, and Obelia are members.
Family V.—ÆQUORIDÆ.
Which is made up of Æquorea, Nygodactyla, and Rhegmatodea.

Order III.—TRACHOMEDUSÆ (Haeckel).
Family I.—PETASIDÆ.
Comprising the one representative Petasus.
Family II.—TRACHYNEMIDÆ.
Containing the Rhopalonema.
Family III.—AGLAURIDÆ.
Likewise represented by one example, the Aglaura.
Family IV.—GERYONIDÆ.
Claiming the Liriope and Carmarina.

Order IV.—NARCORNEDUSÆ (Haeckel).
Family I.—CUNANTHIDÆ.
Has only one representative, the Cunina.
Family II.—PEGANTHIDÆ.
This, like the former, has also a single representative, the Polyxenia.
Family III.—ÆGINIDÆ.
Containing Ægina and Æginopsis.

Family IV.—SOLMARIDÆ.

Which numbers the Solmissus and Solmaris as its members.

Order V.—HYDROCORALLINÆ (Moseley).

Containing two families (1) the MILLEPORIDÆ, and (2) the STYLASTERIDÆ; the former represented by one member, the Millepora, the latter by three, the Sporadopora, Distichopora, and Astylus.

Order VI.—SIPHONOPHORA.

Divided into four Sections or Sub-orders—

I.—PHYSOPHORIDÆ.

Family I. —ATHORYBIADÆ.

Comprising the Athorybia

Family II.—PHYSOPHORIDÆ.

Containing the Physophora.

Family III.—AGALMIDÆ.

In which we find Forskallea, Halistemnia, and Agalma.

Family IV.—APOLEMIADÆ.

Represented by Apolemia.

Family V.—RHIZOPHYSIDÆ.

Exclusively occupied by Rhizophysa.

Sub-Order II.—PHYSALIDÆ.

Family I.—PHYSALIDÆ.

Represented by Physalia.

Sub-Order III.—CALYCOPHORIDÆ.

Family I.—HIPPOPODIIDÆ.

Containing Gleba.

Family II.—DIPHYDÆ.

Numbering Praya, Diphyes, and Abyla.

Family III.—MONOPHYIDÆ.

Comprising Sphœroneetes.

Sub-Order IV.—DISCOIDEÆ.

Made up of one family, VETELLIDÆ, represented by Vetella and Porpita.

(To be continued.)

HORNBY CASTLE AND ITS STORY.

Mr. J. F. Curwen advances a new theory in respect of the origin and history of Hornby Castle. The earthwork, one of the largest and most clearly defined in the district, is situated on a bold cliff-like eminence overlooking the Lune on the Launds Farm, and is approached from the road by a small wicket. Mr. Curwen believes that this work is the original site of Hornby Castle. In support of this opinion he declares that Hornby Castle is the site of a Roman villa. When the Teutons overran the district they destroyed every vestige of Roman civilisation, and planted their settlements adjacent to but never upon the Roman situation. This theory is diametrically opposed to that taken up by most historians. When Horn and his followers came up the Lune they settled upon the site in question for their geweorc, rather than the already entrenched position now occupied by the Castle. By degrees, so Mr. Curwen proceeds, they possessed themselves of the land, and formed the little town along the banks of the river, which they called, after their founder, "Horns Town"—Hornby. At the time of the Norman Conquest this place was held by one Alric, whose son, Sweyn, had had to submit to the Norman Roger de Montebegon, whom Roger de Poictou, Earl of Lancaster, had placed over the barony. To show how quickly the conquered people were reconciled to their conquerors, we find a grandson of Montebegon marrying a granddaughter of Sweyn. This brings us to the period when the days of anarchy resulting from Stephen's reign were over, and the riverside fortification was abandoned for the new stone Norman castle on the site of the Roman villa. This Danish earthwork was exactly what the Normans wanted, and they transformed it into a "mote and bailey" before erecting their stone castle. A similar procedure was shown four years ago to have been carried out in the case of Kendal Castle. The theory is supported by Mr. Swainson Cooper in his volume on earthworks in Cumberland and Westmorland, in which he states that the Teutons had a strong superstition against occupying the ruins of human habitations, as well as a strong objection to Roman civilisation. If that be true of Westmorland and Cumberland, why should it be less true of Lancashire?

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On Saturday, September 9th, the Manchester Field Naturalists visited Alderley Edge, where the leader, Mr. James B. Milner, took the party over a new and beautiful route, and had considerately arranged a delightful drive for older members.

THE LATE MR. C. ROEDER.

We record with sincere regret the death of Mr. Charles Roeder, of Manchester, which occurred recently. Like many busy men in Manchester, he found time in spite of a strenuous commercial life, to indulge in a passion for scientific pursuits. His appetite for these things was insatiable, and he included in the scope of his research work such an extended list of subjects as conchology, botany, geology, philology, geography, and historical research. Nor was it a mere cursory knowledge he possessed. Everything he took in hand he believed in doing well, and he acquired a vast store of information bearing upon the subjects he had so much at heart. Archæology was his principal study, and he delighted in diving into prehistoric channels. In one direction he has accomplished something that will not only preserve his own name but will in time to come prove a priceless treasure to the City of Manchester. In the collection of stone and flint implements, the accumulation of rough stone tools he was indefatigable, and he has pursued with success his one great aim, to rescue from oblivion the remains of Roman Manchester, and to place them in the possession not of strangers, but in the charge of the city itself. The Roeder collection is one of the features at the Old Manchester and Salford Exhibition at Queen's Park. He became a member of the Lancashire and Cheshire Antiquarian Society in 1887, the year of one of the British Association Meetings in Manchester, in which he took the liveliest interest. He was elected an honorary member of the Antiquarians in 1904. To their Transactions he has contributed many important notes on prehistoric subjects, and has also dealt, as with other sources, on topography, Roman antiquities, genealogy, folklore, and other kindred subjects. He was a native of Gera, Thuringen, but had been in Manchester over forty years. He was sympathetic, helpful, and generous, deeply imbued with the scientific spirit, blessed with an infectious enthusiasm, and he will be much missed.

REFERENCE LIBRARY, SALFORD. PEEL PARK.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

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The Egyptian Goose (*Chenalopex egyptiaca* Gould) at Ashworth.

Many of the farmers in Ashworth have recently had their attention drawn to a large bird, which first appeared in that neighbourhood on Wednesday, August 30th. The attempts that were made to catch it were without success for a time but eventually the bird settled on the land belonging to Paper House Farm just below Ashworth Chapel, to which place it was doubtless attracted by the domesticated ducks there. The farmer, Mr. Ingham, was fortunate enough to catch the visitor alive, and he now has it in confinement. It has been identified by Mr. W. Lord, taxidermist, of Smallbridge, and myself as an Egyptian Goose (*Chenalopex egyptiaca* Gould). This is the first instance of a capture of this kind recorded for the Rochdale district, and for other districts such records as exist are only for specimens taken with the gun. The bird is fully grown, but whether it is a male in immature plumage, or a female, had not been ascertained with certainty at the time of writing, as the sexes are very much alike. The Egyptian Goose is a native of Northern Africa.

In his *Birds of Lancashire*, Mitchell lists the Egyptian Goose with "species which have been procured in a wild state, but most probably have been escapes from confinement," and he says examples have been shot several times on the Ribble. Bowdler Sharpe considers that the many examples which have been shot have escaped from confinement, and Howard Saunders excludes it from his "List of British Birds." On the other hand F. O. Morris records the capture of many presumably wild examples, and B. R. Morris says that on one occasion a flock of eighty of these birds appeared in Hampshire. Whether the bird now in the possession of Mr. Ingham has flown from Africa or has escaped from confinement in this country is

difficult to decide. It certainly shows no sign of having been confined. Its plumage is perfect, its flights are uncut, and it is wild and vicious when handled. When caught it had every appearance of having flown a great distance, and it was too tired to rise again when once it had settled on the ground.

The Egyptian Goose is perhaps the most beautiful member of the Goose family. Its bill is pink, edged with black, its head and neck are fawn with a patch of chestnut brown round each eye, and there is a faint ring round the base of the neck. The breast and under parts are pale brown pencilled with a darker shade, and changing to a darker brown on the vent, with a patch of chestnut on the breast. The back is dark brown, the tail black, the primaries of the wings black, the secondaries metallic green, shadlng to purple, the coverts white with a black line across, and the legs and feet pink.

The one caught at Ashworth is a very handsome bird. Many people have been to Paper House Farm to see it.

F. WILLIAMSON.

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HERONS IN LANCASHIRE.

A Lancaster naturalist has pointed out, in reference to a local statement that herons were not seen nearer than Keswick, that herons visit Skerton weir every night after dark, and return when day is breaking year in year out. Lord Ashton, of course, has a heronry on the Ashton Hall estate.

A BIG WASP NEST.

A wasp nest of unusually large proportions was discovered a fortnight ago in the garden of the old snuff mill at Stodday. It consisted of ten layers of comb, containing a total of 11,604 cells. The nest was larger than a football and almost spherical in shape.

A LARGE MUSHROOM CROP.

For over a fortnight in September the supply of mushrooms sent to market from North and Mid Lancashire equalled any quantity gathered from the fields for the past twenty years. Had the weather not changed suddenly in the meantime, there would have been a record gathering.

Lophozia Mülleri (Nees) Dum. in Staffordshire.

In the latest list of Hepaticæ of the county ("Victoria History of Staffordshire," 1908) 82 species are recorded. The writer states that probably more will be added when such localities as the Manifold Valley are more thoroughly searched. In company with Mr. H. C. Broome, I spent a few hours in May last in the Manifold Valley, and am able to add the above species to the list. It was found growing on limestone rocks near Wetton.

W. H. PEARSON.

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Late Blooming of *Menyanthes trifoliata*.

For a few seasons it has been pointed out to me that in one of the basins of the Preston to Kendal canal close to Garstang *Menyanthes trifoliata* blooms twice in the year. During this summer I have had this lot of plants under my personal observation. They commenced to bloom very early in May, and by the end of June there was not a flower to be seen. The leaves have been all along very beautiful. Early this week a few fresh flowers appeared, and in spite of one or two frosty nights these were added to day by day. Is this a usual occurrence with the Bog-bean?

Sept. 23rd, 1911. J. ROLLO.

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In a recent paper on "Pre-Norman monuments of Lancaster and the neighbourhood," Mr. Collingwood remarks that many more pre-Norman stones have turned up recently, and he believes we know enough about the subject now to do some thinking with more certainty than formerly. The crosses at Hornby are mentioned in this connection, including the "loaves and fishes" cross, and various stone crosses or portions at Lancaster, Heysham, and elsewhere are also dealt with. Much valuable information is imparted, and the way in which the battered stones and ornamentations were built up and "restored" proves exceedingly interesting.

A New *Cyclostoma* Habitat.

Being out with Mr. J. Davy Dean, of Lancaster, on Warton Crag, we had the pleasure of finding another locality for *Cyclostoma elegans* at the foot of some high cliffs nearly at the summit of the crag, and about a mile away from the habitat discovered while out with Mr. Standen in Whit-week, 1910. Searching amongst the fallen stones and about the grasses round there, I found several dead shells, and then had the good fortune to come across several living specimens. Owing no doubt to the excessive drought, there appears to have been a great mortality amongst shell life this year, there being very few to be found even after the excessive rain of the last few days. *P. cylindricus* seems to be the most plentiful, and a few *H. hispida*, *H. cellaria*, and some *Ena obscura*, with *H. rufescens* and some fine *C. cravensensis* were about the only ones turning up during a morning's work. A few mouse-eaten remains of *H. aspersa* and bird-eaten *H. nemoralis*, and one living *H. nemoralis*, were all of those species, but what was most remarkable was the enormous number of dead shells found in the crevices of the limestone pavements and under the stones. They must clearly have been abundant on the front of the crag at one time, whereas now they are only found in any quantity at the back and on the west side. Slugs have also been remarkable for their absence, only two *A. hortensis* being seen, and those on the top of the crag against the Beacon. Even in the gardens few have been seen, but *A. ater* has shown itself sparingly the last few days.

C. E. Bailey.

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On a recent visit to Fairhaven, near the new Grammar School, an extraordinary number of "thrush stones" came under notice. No less than thirty were found in the same number of square yards, and the lowest quantity of battered *H. nemoralis* found at the foot of any one was computed at twenty. Few live ones were found on all the sandhills. W.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 146.)

44 { Flesh-coloured, 3cm., *with erect spines*, umbo. acute, *L. spinulosus* Q.
Not spinulose- - - - - - - - - 45

45 { Pale reddish, *granuloso-squamulose* *L lateritio-roseus* Kst.
Pale flesh-colour, 5-9cm., margin *woolly.fibrillose* - 46
Not woolly or squamulose - - - - - - 47

46 { Slightly *zoned*; stem paler than pileus *L. tomentosus* Fr.
Zoneless; stem pallid, milk *yellowish-white* *L. cilicioides* Fr.

47 { Pileus more or less distinctly zoned - - - 48
Not zoned - - - - - - - - - 51

48 { Pileus viscid - - - - - - - - - 49
Dry, rose, zoned darker. *L. flexuosus var. roseozonatus* Mass.

49 { Rufous-brown, 5-9 cm., umbil. wavy, zones darker *L. circellatus* Fr.
Pileus reddish or yellowish-orange - - - - - 50

50 { Stem *solid*, yellowish; pileus 4-7 zoned - *L. zonarius* Fr.
Zones obscure, stem stuffed-hollow, pallid *L. insulsus* Fr.

51 { 10-20cm., *humid*, tan or livid, *slightly* acrid *L. utilis* Fr.
Pileus *viscid* at first, smaller - - - - - - 52
Pileus not viscid, *dry* - - - - - - - 53

52 { Reddish-brown to -salmon, *plane*, *umbil.* 6-10cm., *L. hysginus* Fr.
Dull buff, pinky-tan, 9-18cm., *convex to infund.* *L. trivialis* Fr.
All golden-orange, 3-5cm., gills *very decurrent* *L. aurantiacus* Fr.

53 { Very acrid, deep chestnut (*a*) or crimson sienna (*b*) - 54
Slightly acrid, rufous cinnamon, smooth, 3-6cm. *L. subdulcis* Fr.

54 { *a* Convex, stem *whitish*, flesh *brownish*. *L. capsicum* Schultz.
b Plane to infundibul., umbonate, stem *rufescent*, margin incurved, *pruinosely-downy* at first - *L. rufus* Fr.

Lentinus Fries.

1 { Pileus more or less entire ; stem distinct 2
{ Dimidiate, sessile, or with or sublateral stem ... 8

2 { Pileus squamulose, 3-7cm. Odour strong 3
{ Pileus villose, or pulverulent ; some glutinous ... 5
{ Pileus glabrous, 2-7cm 7

3 { Pallid, umbilicate, scales fugacious, stem *silky* *L. Dunalii* Fr.
{ Stem with downy or minute squamules, pallid ... 4

4 { Pale ochraceous, irregular, gills sinuate *L. lepideus* Fr.
{ White, scales orbicular, at length infundibul., gills *not* sinuate. More slender ... *L. tigrinus* Fr.

5 { 2-5cm. (*a*) matted with resin (*b*) glutinous, also the stem 6
{ 7-16cm., lobed, pale tan ; scented *L. leontopodius* Schulz.

6 { *a* Ochreous cinnamon, waved ; stem even . *L. resinaceus* Fr.
{ *b* Dingy, pale, lacunose, first subumbonate. *L. adhærens* Fr.

7 { Whitish, stained brown, stem branched. . *L. suffrutescens* Fr.
{ Brownish-yellow, lobed, gills pinkish-white, stem branched, *sulcate*; odour spicy *S. cochleatus* Fr.

8 { 1-5cm., fawn, scaly, edge hairy, imbricate *L. fimbriatus* Cur.
{ 3-5cm., *imbricate*, sub- or quite sessile 9
{ 3-5cm., excentric or lateral, *solitary or cæspitose*, pallid-brown, margin lobed-plicate ... *L. scoticus* B. Br.

9 { Reniform-conchate, *corrugated*, tan, floccose, *L. vulpinus* Fr.
{ Reniform, fawn, *glabrous*, edge crenate *L. flabelliformis* Fr.

Lenzites Fries.

1 { On wood of deciduous trees ; pallid, zoned 2
{ On wood of Conifers ; often imbricate, 3-12cm. ... 3

2 { 6-10cm., pallid, *rigid*, tomentose, gills thin *L. betulina* Fr.
{ 3-6cm., thin, *easily bent*, *strigose*, gills thick *L. flaccida* Fr.

3 { *Gibbous*, *rugose*, yellowish, gills crowded. *L. heteromorpha* Fr.
{ Thin, flat, (*a*) tawny to brown (*b*) umber to sienna; zoned 4

4 { *a* Strigoso-tomentose, lobed ; gills *anastomosing*. *L. sæpiaria* Fr.
{ *b* Tomentose to smooth ; gills *forming teeth* L. *abietina* Fr.

Lepiota Fr.

(Fig. 2, p. 363, vol. 2.)

The Species occur on rich, grassy places, etc., less frequently in woods. The stem apex terminates in a socket-like hollow in the pileus of many species, marking the different texture of the flesh of the stem and pileus.

1 { Cuticle of pileus *dry*, smooth or scaly... 2
{ Cuticle *viscid*, not broken up 33

2 { Ring moveable ; gills remote, stem bulbous (*Proceræ*) 3
{ Ring fixed ; gills less remote 8

3 { *Strongly* umbonate, ochraceous, scaly 6-12cm. L. *prominens* Fr.
{ Umbo. less prominent 4

4 { Pileus 10-25 cm. diam., brown-scaly 5
{ 5-8cm., subglobose or subumbonate, slightly scaly... 7
{ 3-5cm., entirely whitish, umbo. acute *L. mastoidea* Fr.

5 { Flesh *reddish* when broken. Scarcely umbonate ... 6
{ Flesh *white*; umbonate; stem cracked across.. L. *procera* Fr.

6 { Subglobose, coarsely *scaly*. stem not cracked. L. *rachodes* Fr.
{ Convex, *fibrillose*, edge sublacerate ... *L. permixta* Barla.

7 { Globoso-plane, whitish bistre, stem 5-8cm. *L. excoriata* Fr.
{ Subumbonate, scales brown, stem 12-16cm. L. *gracilenta* Fr.

8 { Ring inferior. Pileus and stem granular 9
{ Ring superior. Pileus not scaly ; small, slender ... 12
{ Ring more or less distant, superior. Squamulose ... 18

9 { Persistently brick-red, 4-7cm., gibbous, *L. cinnabarina* Schw.
{ Bright salmon-orange, covered with dark purple-brown granules, gills adnate ... ...*L. atrocrocea* Mass.
{ Pileus yellowish to rusty, smaller (2-3.5cm.) 10

10 { Yellowish pink, flesh white ; smell strong. *L. carcharias* Fr.
Smell not evident... 11

11 { Ochraceous. Flesh *yellow*, gills adnate. *L. amianthina* Fr.
Rusty then paler. Flesh tinged reddish *L. granulosa* Fr.
Brownish, spotted reddish scales; flesh white. *L. polysticta* Bk.

12 { Smell of tar, white *powdered violet*, 1cm. *L. Bucknallii* Bk.
Odourless... 13

13 { Pileus and stem glabrous 14
Pileus and stem atomate or squamulose at first ... 15

14 { Yellowish to brown, even 1-5cm ... *L. mesomorpha* Fr.
White. Stem subbulbous, ring deciduous, thin. *L. serena* Fr.

15 { Whitish-buff, umbo. rufous, 3cm., tough, silky, margin *subplicate* ... ... *L. marasmoides* Speg.
White or tinged yellow or reddish, *even* 16

16 { Gibbous, 1-5cm., silky ; ring entire ...*L. parvannulata* Fr.
2-4cm., ring fibrillose or imperfect 17

17 { Glistening-atomate, stem silky ... ... *L. sistrata* Fr.
Mealy then naked, stem mealy ... *L. seminuda* Fr.

18 { Pileus striate or plicate 19
Pileus even 20

19 { Whitish, 3cm. Spores 15-16 x 6*u*. *L. metulæspora* B. & Br.
Sulphur or white, 5cm., *mealy*, sp. 8 x 4 *L. cepæstipes* Fr.
Pale lemon, 3cm., *glabrous*, sp. 10 x 5. *L. licomophora* B. & B.

20 { Glabrous or fibrilloso-silky. White or pallid buff ... 21
Pileus becoming squamulose, granular, or cracked ... 22

21 { Soft, buff white, 6-9cm., ring large ...*L. holosericea* Fr.
Fragile, white, 4-7cm., ring disappearing *L. erminea* Fr.

22 { Rufous-scaly, 2cm., lemon-yellow, gills same *L. citrophylla*
White, 3cm., umbo. and concentric scales black. *L. felina* Fr.
Buff, 4cm., concentric scales brown, edge of gills dark umber ... ...*L. nigromarginata* Massee
Without these characters 23

(To be continued.)

THE ANTIQUITIES OF HEYSHAM.

Mr. W. G. Collingwood, F.S.A., at the September excursion of the Cumberland and Westmorland Antiquarians, gave a short sketch of the remains in and about Heysham churchyard. Speaking of the hogback stone, he referred to the strange mixture of heathenism and Christianity which it pourtrays. The representation of Odin hanging on a tree was the first indication of the cross of Christ. The illustration of the tree Igdrasil on the one hand, and of the horse of Odin on the other seemed to clinch the argument that it was a real reference to the crucifixion. There were three places in this neighbourhood which had distinct and interesting illustrations of the same group of poems referable to the end of the tenth century, when Norse myths were being flavoured with Christianity.

The chapel was most interesting to the antiquary because of its mystery. It was called after St. Patrick, because of the tradition that he landed there. While he was not prepared to admit the truth of the tradition, it was most curious that early Anglican churches should be named after an Irish saint. It could be shown, he thought, that by way of Craven there came during the eighth century a stream of Anglican settlers who formed important centres at Halton, Hornby, Lancaster, and Heysham. The rock graves probably dated, therefore, from about the middle of the eighth century. They could not date later than that, for the Danes began to invade the country in the ninth century. The full extent of Irish influence on the west coast of England had never been thoroughly worked out. No doubt intercourse was continually going on, and the fame of St. Patrick had thus reached these shores.

The Old Church of St. Peter.

Mr. J. R. Nuttall, F.R.Hist.Sc., gave a review of the history of the old Church of St. Peter. The church contained examples of Saxon, Norman, and later styles of architecture, and the bells were dated 1723 and 1724. The registers began in 1628.

It was probable that a small Saxon church existed on the site, and that the remains of it were incorporated in the Norman building. The chancel was of the fourteenth century, and the south aisle belonged to the sixteenth. The chancel was extended in 1737 by Thomas Clarkson, Rector of Heysham and Vicar of Chipping. In 1864 the north aisle was erected, and it was during that time that the Saxon doorway was discovered at the west end and re-erected in the churchyard. The font cover was Jacobean, and there was some very old woodwork in the screen. The finest object in the church was the floriated thirteenth century cross, which probably covered the grave of some warrior minstrel and had now been built into the west wall of the north aisle.

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UNITED FIELD NATURALISTS.

The usual Quarterly Meeting of this Society was held on Sunday, September 10th, 1911, in the Rooms of the Star Field Naturalists, Portland Street (near the Baths), Ashton-under-Lyne. It was a very successful meeting, and was thoroughly enjoyed by a good attendance of members. One of the features of the exhibits was a fine display of British and foreign plants, brought by Mr. A. Binns, and gathered at Timperley, This exhibit attracted so much attention that a desire was expressed that a ramble should be arranged to visit such a rich hunting ground for the botanist. In response to this wish a ramble was arranged for September 16th.

In the afternoon, at 2-30, a Lecture was given by Mr. Sam Radcliffe on the subject of "Nature in Winter," with lantern illustrations, and this was followed by a few slides representative of bygone and well-known naturalists.

An apple weighing 1lb. 5oz. has been picked up in his small orchard by a gentleman at Much Hoole.

LIVERPOOL BOTANICAL SOCIETY.

There was a moderate attendance at the Hartley Botanical Laboratories at the monthly meeting held on the 12th inst., owing to the absence of many members on holidays and the heavy rain. The Chairman (Mr. J. A. Wheldon, F.L.S.) said he was pleased to welcome in their midst once more Mr. R. H. Day, who since he left Bootle had been able to attend only very occasionally. As showing the influence of the Liverpool Society, since Mr. Day removed to Dyserth he had, in conjunction with the Vicar of Dyserth, founded a flourishing Field Club, which numbered more than 100 members. This Club had conducted numerous successful field excursions, and had arranged for a series of lectures to be given during the winter months.

As usually occurs at the August and September meetings, there was no lecture, but the time was profitably occupied in the exhibition and discussion of specimens. Miss Bray forwarded from the South Downs *Carduus acaulis*, *Spiranthes autumnalis*, *Scabiosa columbaria*, *Reseda lutea*, and other plants of interest to residents in Lancashire, from their scarcity in that county. Mr. A. A. Dallman sent fresh examples of the Filmy Fern (*Hymenophyllum peltatum*) and the Thorn Apple or Stramonium (*Datura Stramonium*) from Denbighshire. Growing plants of *Targionia hypophylla* were shown in a very instructive manner by Mr. W. G. Travis. One specimen was moist, showing the fully expanded thallus. Another was in the dry state, in which the "frond" is rolled up in a tubular manner. Both examples were collected at Harlech.

Mr. J. A. Wheldon exhibited a series of specimens collected by Mr. Albert Wilson and himself in Perthshire last July. Amongst them were *Juncus castaneus*, *Euphrasia brevipila*, *Cystopteris montana*, and *Woodsia hyperborea*, all from Ben Laoigh. He also showed two very rare lichens gathered on

the same occasion, viz., *Platysma lacunosum*, from boulders near Loch Laidon, Rannoch Moor, and *Leciographa plumbina*, from near Fortingal, Glen Lyon. The latter is new to Scotland, and indeed appears to have been found on a single occasion only in Britain, in Cumberland. Mr. R. H. Day contributed examples of *Inula Conyza* in fruit, from near Dyserth, and gave an interesting account of the work done by the new Dyserth Field Club, of which he is President.

In the *Geological Magazine* for September, J. Wilfrid Jackson, F.G.S. contributes some "Palæontological Notes from the Manchester Museum," in which he describes "a number of interesting, and hitherto unrecorded, forms from the well-known 'Marine Band' in the Middle Coal Measures of Ashton-under-Lyne." These he has discovered while working through the large collection of Coal Measure fossils in the Museum. "The most interesting of these additions is undoubtedly *Archæocidaris*, a genus which is not at all common in the Coal Measures of this country, though fairly abundant in North America. Hitherto it has only been recorded from the North and South Staffordshire Coal-fields; its discovery, therefore, at Ashton constitutes the third record for the British Isles."

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A market gardener had a peculiar experience recently. In a corner had been strewn some light rakings of hay taken from one of the garden borders. This appeared to have a very great fascination for a number of moss bees, and they were ever on the move about the hay. They resented the gardener's intrusion on this particular patch, and showed such a menacing attitude one day, that it determined him on seeing what the corner really contained. On turning over the hay, which was about an inch deep, he was astonished to find beneath a large number of combs.

ITEMS OF INTEREST.

Preston Society's New President.

The appointment of Father Cortie, S.J., as president of the Preston Scientific Society for the coming session will have given great satisfaction.

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Lancaster's Insignia.

Mr. T. Cann Hughes, Town Clerk of Lancaster, has dealt with the Corporate insignia in a recent paper. The charters of the town were as good as any possessed by any town, with the exception, perhaps, of the ancient city of Chester. One of these, that of Henry III., dated 1227, was that under which the sessions and assizes were ordered to be held at Lancaster. That charter was still operative, for sessions were still held at Lancaster and "by adjournment" at Liverpool and Manchester. The first charter, that by King John when Earl of Moreton, was believed by Mr. Brownbill and others from the wording not to be really the first charter granted to Lancaster. Other objects were dealt with and illustrated—the great mace, considered to be one of the finest in existence, though there were maces at High Wycombe and Ludlow of similar pattern; the Mayor's staff, the oldest insignia possessed by the town; the snuff box with the representation of the aqueduct carved upon it; the punch bowl purchased in 1680 from the proceeds of certain articles of silver then owned by the Corporation; the handsome silver salvers with the interesting incidents connected therewith; and the unique collection of weights and measures—corn and ale—supposed to have been made from the guns of the Spanish Armada.

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On September 9th the members of the Prestwich and Pilkington Botanical Society visited the nurseries of Messrs. Caldwell at Knutsford.

WITH THE LANCASHIRE AND CHESHIRE ANTIQUARIAN SOCIETY.

Many members and friends of the Lancashire and Cheshire Antiquarian Society had a pleasant outing to Chapel-en-le-Frith on September 16th. They were under the leadership of Mr. C. T. Tallent-Bateman, and from the station were conveyed in brakes via "Higher Crossings," Mr. Bateman detailing en route the many features of interest, including the well known variously as "Nanny's Well," "St. Anne's" and "St. Ninian's" Well. On arrival at the Market Place the stocks were pointed out, which are believed to be unique, because not only are the cross bars preserved entire, but the original seat and the actual iron bands and padlocks in use in the eighteenth century. Mr. Bateman referred to the old portion of the ancient inn, the ancient market cross, the ancient road between Stockport, Castleton, and Sheffield, and to old buildings behind the Market Place. An ascent of the church tower enabled the leader to give an address on the history of the church and of the parish, with the High Peak Forest, out of part of which these were built and formed in 1225. The leader also gave an account of the ancient customs preserved in the parish, including the "Curfew" bell in the evening, the "Pudding" bell at noon, the "mourning" bell in the early morning announcing any death during the previous afternoon and night, and indicating even the sex and age of the deceased and whether or not he or she died in the immediate vicinity of the church. "Liquorice-bottle" day was also mentioned, and "Gunpowder Plot" day, when official sanction is given to public demonstrations in the Market Place. In the interior of the church were described the more interesting features, including the rose-coloured stone (unique in Great Britain, at least) of which the arch columns are built. When due inspection of these interesting items had been made, the conveyances were again sought, and Old Slack Hall was visited, formerly the residence, before rebuilding in 1727, of a Quaker family named Lingard, and the meeting place of the local Friends. The Friends' burial-ground at Ford Hall was visited.

LANCASTER PARISH CHURCH.

On September 8th, in continuation of their two days' tour of North Lancashire, the members of the Cumberland and Westmorland Antiquarian and Archæological Association paid a visit to Lancaster and Heysham. After visiting the Judges' Lodgings, Covell Cross, and Penny's Hospital, with other places in the town, under the guidance of Mr. T. Cann Hughes, F.S.A., Town Clerk, they were taken over the Castle by Mr. Dawson, the Constable. Later on the Parish Church was visited, and here the architect in charge of the extensive work of restoration now proceeding, Mr. H. J. Austin, gave an interesting account of some of the leading features in its history. He thought it somewhat remarkable and disappointing that so little was known of the history of the actual building of so important a church as that belonging to the Benedictine priory of St. Mary, and he hoped during the following week to investigate to the north the foundations of the Transitional apse discovered under the concrete three weeks before.

The whole of the present church building was of the Perpendicular period, excepting certain remains of Transitional and Decorated work and additions made since 1759, when the present tower was built. The exact date of the Perpendicular work might be from 1430 to 1440. Judging by the pre-Norman grave crosses found in the rubble of the old north wall when it was pulled down in 1903 to allow of the building of the King s Own Memorial Chapel, it was certain that there was a very ancient cemetery of considerable importance. The first actual date known was that of the foundation of the priory by Earl Roger of Poictiers in 1094. He built the Norman keep of the Castle, and gave the church to St. Martin's Abbey at Sees, and placed in the priory three priests and two clerks, with their servants. In 1898 the old outer west door of the Decorated period (probably 1360) was discovered by the removal of the plaster from the west wall under the gallery, and at the same time there were discovered the early door to the north of the Decorated door and indications of a possible early arcade. The old tower was to the north-west of the present one, so that it seemed certain that the length of wall containing that door formed the eastern wall of the ancient tower, and might be, as had been supposed, pre-Norman. This tower might possibly have been an early tower of sanctuary, with a church attached to it about the size of Overton Church. The Perpendicular respond was built against the early wall. Judging by a Transitional capital and

base which had been found, it would appear that the early church at some time had had aisles, and that possibly the present Transitional south door, now supposed to have been rebuilt in a Decorated wall, might originally have opened into an early south aisle, and a second door, of which remains were discovered in the rubble of the north wall, might have opened into a north aisle. The earliest and smaller church might have been about 15ft. wide, like that at Overton, and he suggested that the apse foundations discovered the other day might be of the same date as its aisles, and that this apse was an enlargement of the church eastwards about 1180 on account of the growth of the priory. The Decorated west door would necessarily open into the south Transitional aisle, and at that time it would seem that the Transitional arcade, or part of it, was taken down, as the Transitional respond capital was found in the rubble of the Decorated west wall when a new window was inserted about six years ago.

Why this arcade was taken down, and what the Decorated extension was intended for, unless for a large porch like that at Christ Church, was not evident, and it was just possible that the respond capital and base belonged to a chancel aisle only. The next date of which there was any record was 1281, when Archbishop Wickwayne, of York, held a visitation at Lancaster priory, and deferred consecrating the extension of 30 feet eastward for two years. The foundations running east and west in the chancel, and found the other day, might represent this extension. He hoped that if the nave floor was taken up they might be able to verify some of those propositions or discover further history of the building. On the dissolution of the alien priories in 1414 Lancaster was annexed to the abbey of Syon, in Middlesex, in 1424. The list of priors was fairly complete. It would be very interesting if the foundations of the priory could be excavated. There was a gatehouse of importance to the north-west shown in Speed's map of 1610, and near this position he (Mr. Austin) a few years ago picked up one of the Decorated groining ribs. All the windows except the east were of one design, and until about six years ago there was no west window at all. It was possible that the present south window of the tower was based on an ancient Decorated tower west window, and might have some old parts about it, but the design was totally different from anything in the tower, and might be of the date of the west door, There was, of course, no trace of the Benedictine cloister on the north wall,

which, before rebuilding, was of very plain rubble and not of coursed masonry. The tower was rebuilt in 1759, quite detached, by a Liverpool architect, as the old tower was falling. New vestries were built in 1871 and 1891, the south porch in 1902, and the chapel in 1903. As regards ancient woodwork, part of the aisle roof was of the Perpendicular period, and the church possessed fourteen magnificent oak carved stalls and canopies of the Decorated period, somewhat flamboyant in character, dating about 1350. For the period they were unequalled in excellence. They were said to have been brought from Furness or Cockersand, but the latter abbey seemed to have been too small for such large stalls. The priory church of Lancaster escaped demolition, but Furness Abbey was dismantled in 1537, so that that abbey seemed to be more likely. There were also good examples of a Jacobean font cover, and pulpit, and three fine Flemish chandeliers. Mr. Austin then conducted the party over the church, and showed the position of the ancient walls.

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Tumulus at Ford Hall.

At Ford Hall, on September 16th, the Lancashire and Cheshire Antiquarian Society inspected the cinerary urn and the cup and flint implements unearthed from the tumulus which with double circles of stones was recently found on the estate of Mr. Greaves-Bagshaw, D.L., the owner of Ford Hall. The famous Tutbury horn (John o' Gaunt's), giving its holder many summary rights and among other privileges that of appointing the local coroner, was also inspected, and an ancient Sedan chair, a man-trap, a spring gun, and many weapons now discarded. After inspecting the gardens and grounds of the hall, a stiff but delightful climb took the party to the site of the tumulus, etc., at "Green Low."

REFERENCE LIBRARY, SALFORD, PEEL PARK.

Work and Workers.

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PROF. F. E. WEISS, D.Sc., Lond., M.Sc., Manch., F.L.S.

Professor Weiss is a very busy man, and his time has been fully occupied during the past few months. His character is one appealing forcibly to Lancashire sentiment, and he has been aptly described as "one of the most approachable of scientific men." This trait it is undoubtedly that has rendered him so popular both in his University and in his public work.

A Yorshireman by birth, for he was born at Huddersfield on November 2nd, 1865, the bulk of Professor Weiss's practical work has been accomplished in Lancashire. With Manchester he has been long and honourably connected, having for close upon 20 years been actively connected with its botanical and scholastic life. A son of Mr. Charles Weiss, a merchant, of Huddersfield, he was educated at the Gymnasia of Heidelberg, Germany, and of Neuchâtel, Switzerland; the International College, Isleworth; University College, London; and the University of Strasburg. With the wide and influential learning he thus obtained, he was able to combine the skilful and clever methods of many excellent teachers, for he studied under such master minds as Professors Daniel Oliver, E. Ray Lankester, and F. W. Oliver, at University College, London, and Professor Lankbach, University of Strasburg. He obtained a Scholarship on graduation at the University of London in 1888. He was appointed Quasi-Student and Lecturer in Botany at University College, London, in 1889. But three years later, in 1892, on the death of Professor Williamson, he was called upon to take up duties in the important post of Professor of Botany in the Owens College, Manchester, a position he has since occupied with increasing honour to himself, and with considerable advantage to both University and students. He had a remarkable man to follow,

for Prof. Williamson was not only a clever botanist and a skilled geologist, but he was the founder of Palæobotany, the branch which has occupied the whole-hearted attention of Prof. Weiss, and in which he has distinguished himself. In the microscope he has ever been ardently interested, and has for many years been a member of the Manchester Microscopical Society. He was President of this body for the years 1894-99, and was re-elected as President during the present session. In addition to this he is holding during 1911 the Presidency of the Manchester Literary and Philosophical Society, one of the oldest scientific societies in the country, if not the oldest after the Royal Society. During the past month he acted as the President of the Botanical Section of the British Association Meeting at Portsmouth, giving as the Presidential Address a paper dealing with fossil plants. He was also a participant in the International Phytogeographical Excursion immediately preceding that important gathering.

In taking upon himself the arduous duties which the Presidency of two such important Manchester Societies will necessarily involve, Professor Weiss is entering upon no light task, but he may be trusted to do honour to both positions. His wide knowledge in microscopical studies should render his services invaluable to the Microscopical Society.

He has taken a deep interest in all the schemes which have been introduced for the advancement of education, such as that of University extension, and he has been taken up with the work of the Workers' Educational Association. In introducing a series of "Nature Study" lectures organised recently by the Blackburn branch of this Association, the Professor warmly congratulated the organisers on their new departure, and commended them for realising the value of studies other than economics.

He has contributed many valuable and critical papers on fossil plants to the "Annals of Botany" and to the Memoirs of the Manchester Literary and Philosophical Society.

PRESTWICH AND PILKINGTON BOTANICAL SOCIETY.

A very pleasant and well-attended meeting of the Prestwich and Pilkington Botanical Society took place on Monday evening, August 14th, Mr. G. Hoyle presiding. Interesting specimens forced into bloom by the extraordinary heat were exhibited. Mr. C. J. Feldon, a former secretary, presented a copy of Stansfield's "Flora and Birds of Todmorden," to the library, and the society had also been presented with a collection of mosses and various microscopic apparatus, from the family of the late Mr. George Burgess, at one time president of the Society. Mr. Abraham Stansfield read a paper on "Notable Garden-Amateurs whom I have known," which was of great interest. Mr. Stansfield's experience covered some sixty years, and the paper included a lengthy sketch of the late Mr. W. W. Kirkman, who was claimed to be a great garden amateur, and whose tasteful grounds at The Grange, Timperley, he described in some detail. Mr. Kirkman was spoken of, also, as an enthusiastic botanist, in certain departments of that science, and the departments of botany were many, while the enthusiasts were few. Moreover, the ranks of wealthy garden-amateurs were rather diminishing than increasing. The changed condition of our social life did not favour their increase. Quiet, sober pleasures were for the nonce at a discount; rush and racket seemed the order of the day.

A long and instructive discussion followed the lecture, in which Messrs. G. Hoyle, Councillor J. W. Thompson, W. H. Ward, T. E. Hoyle, A. Mercer, and J. Whitehead took part.

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To P.T.—There are many Calders. The one you refer to lies in the hills east of Garstang.

ACCRINGTON NATURALISTS.

The Accrington Naturalists' Society held their usual monthly meeting in the Mechanics' Institute on the first Saturday in September. The geological specimens were described by Mr. J. Ranson, who dealt with the formation and age of the rocks. He also showed some Brazilian insects which Mr. John Sagar, of Accrington, had collected. Mr. J. Law showed some beautiful stones he had obtained from the Isle of Sark, including moonstone, topaz, amethyst, etc. Some splendid specimens of the common lady fern, the oak fern, beech fern, and royal fern were described by Mr. F. Hollings, who at the close of the meeting gave away several of the plants he had brought down. An interesting object, viz., a hand mill for grinding corn, was spoken of by Mr. R. Ainsworth, who said it dated back to a very early period, though it was used in some parts of the British Isles even to the present day. Through the upper stone a vertical hole was drilled to receive a peg which formed the handle for turning the mill. When in use it was worked by two persons seated opposite to each other, who alternately seized and propelled the handle, so as to drive the stone at a considerable speed. In this way a bushel of corn was ground in about four hours. A grass snake belonging to Mr. Hollings was described by the secretary, Mr. Skinner. This kind of snake, he said, which was found in the British Isles, was from three to four feet long and was non-poisonous. The eggs were laid in manure heaps, where they developed in two or three months. The young snakes shed their skin about three or four times a year, but old ones only once a year. On its back there were about 170 pairs of ribs to which scales were attached, and by means of these locomotion was effected. Its food, consisting chiefly of frogs, was swallowed intact. There were four rows of teeth on the upper jaw and two on the lower jaw. These were pointed backwards and thus enabled the snake to retain a good hold of its prey.

INTERNATIONAL PHYTOGEOGRAPHICAL EXCURSION.

Mr. A. G. Tansley, of Cambridge, has, with the help of the Botanical Survey Committee, organised this summer an International Phytogeographical Excursion, to which a number of distinguished American and Continental botanists were invited. Those who accepted were Prof. F. E. Clements, Minneapolis; Prof. H. C. Cowles, Chicago; Prof. Drude, Dresden; Dr. Lindman, Stockholm; Prof. Massart, Brussels; Dr. Ostenfeld, Copenhagen; Dr. Rübel, Zurich; Dr. Schroeter, Zurich. They were accompanied by various British botanists, including Mr. A. G. Tansley and Dr. C. E. Moss, Cambridge; Mr. G. C. Druce, Oxford; Prof. F. W. Oliver, London; Dr. T. W. Woodhead, Huddersfield; Dr. W. G. Smith, Edinburgh; Mr. R. Ll. Praeger, Dublin; Prof. F. E. Weiss, Manchester; Mr. W. M. Rankin, Lancaster. The tour included a visit to the Fens and the Norfolk Broads, a Derbyshire dale, a Pennine Moor, and the Lancashire sandhills. In connection with the latter part of the programme, the party left Manchester for Southport on August 10th, and then entrained for Ainsdale. Here they had hoped to meet Mr. J. A. Wheldon, of Liverpool, but owing to illness he was unable to accompany them. Mr. Ball, of Southport, however, acted as local guide. From Ainsdale the party walked to Birkdale, examining first the most seaward dunes, and then striking inland to examine the characteristic slacks with the *Salix repens* vegetation and the accompanying plants such as *Pyrola*, *Parnassia*, etc. In the afternoon tea was taken at Rowntree's Café, and the party left for Lancaster, where they were met by Mr. Rankin, of the Storey Institute, who conducted them next day to Silverdale and on the following day to Whitbarrow.

Subsequently the party visited Scotland, including an ascent of Ben Lawers, and then Ireland and Cornwall, a fitting climax being reached by attendance at the British Association meeting at Portsmouth.

Each of the foreign members was presented with an advance copy of *Types of British Vegetation*, edited by Mr. A. G. Tansley, a small octavo volume which will be published by the Cambridge University Press.

MANCHESTER FIELD NATURALISTS.

The evening rambles have been appreciated, and on July 23rd there was a very good attendance indeed on a ramble from Stretford by way of Chorlton to "Jackson's Boat," and then returning by way of Didsbury.

On August 12th Rostherne was visited by the Manchester Field Naturalists, and a good number of members visited this pretty Cheshire village. The younger members of the Society walked over from Ashley, and the remainder chose to drive from Altrincham. At Rostherne a brief visit was paid to the ancient Church of St. Mary, which has undergone considerable revision since its first building, which is said to have taken place in A.D. 1188. To the naturalists the charm of Rostherne Mere specially appealed, and this, one of the most picturesque of the Cheshire meres, was seen at full beauty.

The first portion of the walk from Ashley was remarkable for the number of species of Rumex and other plants of a kindred nature met with. A small reservoir yielded also the skullcap, purple loosestrife, and the great hairy willow-herb. On an old wall at Rostherne occurs the pellitory, and on the banks bordering a lane at the same place was observed examples of the imperforate St. John's wort. It is the exception rather than the rule for parties of this nature to meet with much in the way of wild life. On this occasion much of interest was seen in this direction. Several hares, a covey of partridges, and one of pheasants were met with; waterfowl and seagulls on Rostherne Mere, and a large colony of martins on the barn at Birtles Farm, Mobberley. Under the eaves of this barn, including old ones and this year's, no fewer than 120 nests were counted.

On August 26th, under the leadership of Mr. H. A. Bethell, North Shropshire was visited, with the site of the ancient Roman City of Uriconium. From Shrewsbury Station the

party were conducted by the Rev. W. G. D. Fletcher, Vicar of Oxon., representing the Shropshire Archæological Society, to the Museum, where the miscellaneous objects discovered in the excavations of Uriconium are exhibited, these embracing many varieties of pottery, ornaments, and statuettes in bronze. After the inspection of the Museum the party were driven to the ruins, where the Rev. Mr. Fletcher gave an address, dealing with the history of Uriconium and of the recent excavations that have thrown so much light upon these matters. The further excavations, Mr. Fletcher remarked, are expected to begin next spring, and to continue for ten or twelve years if funds are forthcoming. The inspection of the ruins completed, the drive was resumed to Wroxeter, and here the ancient church was visited, which has a long and remarkable history. Further on the village of Acton Burnell was reached, and by kind permission of Sir Walter Smythe, the old Castle and Parliament House were shown to the visitors, the Rev. Father Stutter acting as cicerone. The chapel where Father Stutter presides was also visited This is contained in one of the wings of the hall, and was built for French Benedictine monks who were expelled from France during the Revolution, and were invited to Acton Burnell by Sir Walter Smythe's great-grandfather. On leaving here the party was joined by the Vicar of Acton Burnell, the Rev. W. Sargianson, and on his invitation the beautiful garden at the Vicarage was visited. Afterwards, at the residence of Father Statter, the workshop, laboratory, and observatory were inspected, for the rev. father is an indefatigable worker, and is an able mechanic as well as an ardent scientist, in which latter work he is most interested in astronomy. Here he has erected electrical plant which illuminates his house, drives the lathe in the workshop, and provides the motor power for the observatory.

On Saturday, September 16th, the members of the Cumberland and Westmorland branch of the Royal Arboricultural Society had a motor tour to Keswick and Rydal, this being their annual meeting.

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Wayside Leaves.

A keen discussion has been going on in a Manchester contemporary on the decline in Cheshire butterflies. Of all the causes urged for this, undoubtedly the most potent is that of over-collecting. It is the case in Lancashire at all events, and to this cause may be definitely traced the practical extinction of certain species in particular localities. As regards our own experience, taking West Lancashire as a guide, it is contrary to one opinion that seems to be generally shared. On the coast line we have seen no marked difference, but certainly inland we have met with larger quantities of both butterflies and moths than in any season for a long time past. On one day in July we noted, in a lane near Garstang, more specimens of *L. phlæas* than we had met with in the five preceding years.

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Another of the old veterans in Lancashire has passed away in the person of Mr. Robert Wigglesworth, Curator of the Accrington Museum. Mr. Wigglesworth's chief delight was in Conchology, as set forth in a brief sketch of him, with portrait, that appeared in our first series. He was an old, and in its early days an active member of the Accrington Naturalists and Antiquarians' Soclety. Much of the information in the jubilee souvenir of this society was from his pen, and he supplied also a list of the land and freshwater mollusca of the Accrington district.

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Mr. Wigglesworth did not approve of the combination of natural history and literary societies, and he strongly urged the younger members of the Accrington Society to devote themselves to one special branch. One result of his advice is seen in the fact that no Society in Lancashire to-day possesses a more promising band of young workers.

Mr. W. R. Eastwood, who succeeds Mr. Wigglesworth as Curator, has the advantage of having been in close touch with the late curator. Not only did he assist in collecting and mounting specimens for the Museum, but he enjoyed the special favour of his predecessor in the position, and may be trusted to ably carry out the ideas initiated by Mr. Wigglesworth. He was one of the joint sub-committee appointed to prepare the scheme for the establishment of the Museum. Through Mr. Wigglesworth he presented a fine collection of zoological specimens to the Museum of which he will now have charge.

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Mr. Eastwood took a leading part in the establishment of the nature study scheme for the local school children, and with Mr. Bamber and others conducted parties of the children out into the country. Descriptions were given of the objects met with, and the children were encouraged to write essays upon what they had seen and upon what they had been told. He has been connected with the Accrington Naturalists' Society for over twenty years, and indeed has held all offices except that of President. He is an enthusiast, and in the furtherance of his nature work has visited many museums, taking a particular interest in the one associated with the University at Manchester. He has a fondness for aquatic life, and in the jubilee souvenir of the Accrington Naturalists' Society he was enabled to contribute a paper on pond life. He is passionately fond of conchology, having been invested with all the fire and enthusiasm of his old comrade. When the now defunct Lancashire Union of Naturalists was first instituted, Mr. Eastwood took a prominent part in the working. We wish him every success in his new sphere of labour.

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The attractive late September ramble of the Manchester Field Naturalists. to the Hebden Valley, brought out a good number of members. The botanical features of Hardcastle Woods were appreciated, as also the geological aspect of Hardcastle Crags.

The Passing Hour.

The Entomologist's Monthly Magazine for October contains an interesting paper on British Earwigs by Malcolm Burr, D.Sc., etc., illustrated by a beautiful coloured plate containing figures of all our species. The price of the Magazine is 1s.; obtainable from Gurney and Jackson, 33, Paternoster Row, E.C., and should be in the hands of every entomologist.

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The Dresser Collection of Birds at the Manchester Museum has for long been one of the attractions at this valuable educational institution. Through the generosity of several friends, this fine possession is to be augmented by the "Dresser Collection of Birds' Eggs" and his fine Ornithological Library. These the Museum has acquired at a cost of £1,000, and they will soon be arranged under its own roof. By this acquisition the ornithological position of the Museum will be made very strong.

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At the annual meeting of the Manchester Geological and Mining Society, it was mentioned that the Council of the Manchester University had decided to extend the museum for the reception of the Egyptian collection, additional provision being also made for the geological and mining collections, together with a room for the use of members of the Society. The scheme will cost about £10,000, towards which £7,000 or £8,000 has already been promised or subscribed. The Council of the Society having appealed to the members and others interested in mining and geology to support the project, subscriptions and promises had been received. It was pointed out by Professor Boyd Dawkins that the proposed extension of the Museum buildings would be greatly to the interest of geology and mining. He looked forward to the bonds between the University and the Society being drawn closer together.

The annual Soiree of the Manchester Microscopical Society was a very successful affair. There was an unusual number of exhibits, and many of these had reference to the subject of the lecture which was to be given by Dr. Tattersall. The hints that had been thrown out as to making the exhibits more educational to the general public had not been in vain, and there was quite an appreciable change in this respect.

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In the evening Dr. W. M. Tattersall gave a lecture on "Plankton." The meaning of the word had been gradually extended until at the present time it includes practically all free swimming as well as free and floating organisms. The subject had until recently been treated only from a qualitative point of view, but about twenty-five years ago when the results of marine biological research came to be applied to the economic problems of our fishing industries, it was apparent that a quantitive knowledge of the plankton was at least desirable if not essential. In discussing the seasonal variations in marine plankton in the Irish Sea, it was shown that plant-plankton was more abundant numerically than animal plankton if the total plankton for a year was considered; that the plant-plankton reached a maximum in the spring and a second lower maximum in September; that the animal plankton reached its maximum in July and August; that plankton generally reached a minimum in winter. The causes of the seasonal variations in plankton were considered, and it was shown that the amount of sunlight in the early months of the year not only influenced the abundance of phyto-plankton and consequently zoo-plankton during the year, but also influenced the time of their maxima. Other variations, such as diurnal movements of the plankton, and the variations due to wind, weather, and currents, were referred to.

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Mr. J. Ranson, of Accrington, opened the winter session of the Darwen Naturalists' Society with a lecture on "The Great Ice Age." Lancashire aspects were especially dealt with, and reference was made to the limestone formation at Chatburn, the drifts at Blackpool, and several peculiarities at Rishton, Knuzden, and Hest Bank.

LIVERPOOL BOTANICAL SOCIETY.

At the monthly meeting, held on Tuesday evening, October 10th, in the Hartley Botanical Laboratory, Mr. Delaney exhibited an interesting series of abnormal leaves of two species of clover, *Trifolium pratense* and *T. repens*, collected in Orkney this summer. The number of leaflets varied from two up to seven. Mr. A. A. Dallman showed fruiting examples of *Convolvulus sepium*, the Great Bindweed, and explained that it was rare in this condition, owing to the scarcity of the Convolvulus Hawk Moth, the only insect able to fertilise its flowers. In discussing the matter the Chairman (Mr. J. A. Wheldon) stated that he had a living specimen of the moth in question brought to him eighteen years ago, which was captured at Walton, but that he had not observed it in that vicinity since. Miss Bray sent a number of fresh specimens of *Senecio viscosus* and *Pyrus torminalis* (in fruit) for distribution, collected in Sussex. Mr. Harold J. Wheldon reported that he had received a satisfactory response to his appeal for Lancashire Fungi, and communicated a list of species received since last meeting from Mr. W. G. Travis (Walton), Mr. Jno. C. Healey (Rochdale), Mr. Robinson (Colne), Mr. J. W. Hartley (Carnforth), and the Rev. C. Fynes Clinton (Leyland). Water-colour sketches of a number of the Fungi were exhibited.

Mr. W. O. Delaney then read his paper on "Old English Herbals." He first traced the history and evolution of these quaint works from the very earliest examples, which were mere repetitions of the old Greek authors, down to those published in the time of Ray, when botany first became a science independent of medicine and therapeutics. Examples of many rare Herbals were exhibited, for the loan of some of which he had been indebted to Prof. Harvey Gibson, the Rev. S. Gasking, and the Chairman. The second portion of the paper was devoted to an exposition of the style of the various writers, with explanations of the title pages and methods of illustration adopted at various periods; and finally, excerpts representing the quaint phraseology and ideas of Turner, Gerarde, Parkinson, Culpeper, etc., were read. The paper was greatly appreciated and enjoyed by those present, and a hope was expressed that it might appear in one of the Society's publications. On the motion of the Chairman, seconded by Mr. A. A. Dallman, a hearty vote of thanks was accorded to Mr. Delaney.

RECENT RESEARCHES ON HEREDITY IN PLANTS.

The first meeting for the session of the Manchester Literary and Philosophical Society, held on October 3rd, was well attended, and was one of great interest. The President (Prof. F. E. Weiss) dealt with "Recent Researches on Heredity in Plants."

Professor Weiss referred to the work of early investigators, and mentioned the experiments of Abbot Gregor Mendel in the crossing of different strains of peas. From the results obtained Mendel deduced the two fundamental laws of heredity—firstly, the dominance of certain unit characters in the first hybrid generation, and secondly, the segregation of the dominant and recessive characters in the second hybrid generation. Confining himself to the phenomena of heredity in plants, the Professor touched upon some of the investigations of Correns and Bateson on colour inheritance in sweet peas and other plants respectively, and referred also to his own experiments in crossing the scarlet and blue forms of the common pimpernel. The resultant form was completely scarlet, like one of the parents, but in the subsequent generation twenty-five per cent. of the offspring were pure blue. The same result was obtained by crossing the blue form with pollen from a pink variety of the pimpernel, blue being recessive in the first hybrid generation. Bearing on the analysis of hybrid plants, Professor Weiss referred to his experiments with *Geum intermedium*, a cross between the Common and the Water Avens, a hybrid not uncommonly met with in the limestone dales of Derbyshire. This plant expresses in the size, colour, and shape of its flowers an intermediate condition between its two parents, and is thus easily distinguished from either. The flowers of the hybrid possess both the yellow plastids of the Common Avens, and the red sap (anthocyanin) of the Water Avens. When pollinated with its own pollen this very fertile hybrid gives rise to a plant some of which have red

flowers without any trace of yellow, while others are yellow with no red sap, and in addition a number of plants with pure white flowers were obtained. A similar "throwing" of white flowers was observed in the offspring of the hybrid between the primrose and the oxlip. The question of the determination of sex has also been attacked from the botanical standpoint by Correns with some success, and his results on the whole tend to confirm the view that this problem may yet be satisfactorily solved on Mendelian lines.

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Mr. F. W, Parrott. at one of the Thursday meetings of the Mounting Section of the Manchester Microscopical Society, gave a demonstration on "Polarised light." After describing and illustrating by mechanical models the propagation of ether particles into light waves, Mr. Parrott led up by a sequence of illustrations to the manner in which colour is obtained by means of polarised light. To the microscopist this is the feature which appeals to him most, as by means of his polariscope he is able to obtain from his colourless microscope slides of crystals or animal tissues effects which shame the work of the most subtle colourist. The listeners were then shown the commercial value of polarised light as an agency in the hands of analysts for the valuation of invert sugars, or again as a highly scientific means for the examination of the structure of crystals, purposes which lifted the value of polarised light from that of an amusing pastime to a valuable scientific asset.

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Mr. E. Haworth, the new President of the Accrington Naturalists' Society, in his presidential address treated of "Life from a biological standpoint." He spoke of the great advance in the study of biology within recent years, and of the various secondary problems that had been solved by the aid of successive scientific discoveries. He also touched upon the greater problems still awaiting a satisfactory solution.

DECLINE OF OLD CUSTOMS.

On October 8th, at the Manchester Literary Club, the Rev. A. W. Fox read a paper on "Pancake Tuesday." The Catholic Church, he said, had seized upon many of the older heathen festivals and transformed them into ecclesiastical feasts. Among such celebrations are those of Shrovetide, which brought with it in one instance a cycle of curious customs, now fast slipping away from memory and observance. On Shrove Tuesday pancakes were the chief symbol of rejoicing, and people met together to consume them, and in the frying and consuming certain ancient customs must be observed. The Christmas evergreens were taken down and set beneath the frying pan. No housewife among the older folk would dream of allowing these evergreens to be taken down before Shrove Tuesday. The mistletoe thus burnt was supposed to work wonders against witches, and the holly completed the antidote or charm. Each reveller had to toss his or her own pancake, and to eat it whatever might be its fate in the tossing. Those who did not eat their cake before the next was ready were ridden out of the house on a broomstick. These and other old customs are dying out. Many have already passed away, and with them something has gone from life which no learning can replace.

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INTERESTING PLANTS.

At the October meeting of the Prestwich Society, the beautiful South American plant, *Browallia speciosa*, with its numerous flowers of the most brilliant purple, was first and foremost in an excellent display of plants. Introduced into this country in 1847, this charming species, which was often in evidence fifty years back, and considered then as almost indispensable for greenhouse decoration, is now seldom seen, a circumstance which, considering that few denizens of the warm greenhouse are of easier culture, is as surprising as regrettable. From the warm greenhouse came also a pretty strain of *Streptocarpus*. Among orchids a fine example was shown of the very singular and striking lady's slipper, *Cypripedium fairrieanum*, of the re-discovery of which, a few years back, Mr. Bamford, who exhibited it, as well as one or two of its hybrids, gave a very interesting account.

LANCASHIRE AND CHESHIRE ANTIQUARIAN SOCIETY.

Dr. Thomas Carr, of Blackpool, on October 13th, entertained the members of the Lancashire and Cheshire Antiquarian Society with a paper on the Swastika, the ancient symbol. He first showed its almost universal distribution throughout the world in ancient times. Then he stated that in later or historic times the Swastika had been used by Romans on their altars, on Runic crosses in Great Britain, on Gothic and Scandinavian weapons and ornaments, and on English brasses of the thirteenth and fourteenth centuries; whilst it was still in use in China, Thibet, India, Korea, and Japan, as well as among the Lapps and Finns and by the Navajo North American Indians. The meaning of the word Swastika, which is Sanskrit and can be traced to the fourth century B.C., is benediction or good augury. It is not found in the Stone Age, but seems to have spread to the same countries as did bronze, with the use of which it was contemporaneous. The lecturer also described its use by the existing lodges of the Guild of the Operative Free Masons, where it was still regarded as the symbol of the Most High God, and where it was also associated with the Polar Star. Dr. Cross maintained that the Swastika was originally the symbol of axial rotation, and as such primarily referred to the rotation of the Seven Stars of the Great Bear round the Polar Star. Its association and symbolism became transferred later to the sun; and it became an emblem of dedication, and as such was used by the Buddhists, and still was by the Jains. It first appeared in the Bronze Age. The people who used it were originally all members of the Turanian race, and its use by later peoples could be traced to its use by the same Turanian race. Its use at present was chiefly as a talisman or charm.

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The Manchester Field Naturalists visited Harrogate for their autumn excursion. They left Manchester on Friday, October 13th, and in the evening were entertained with a lecture by Mr. Riley Fortune on "Bird Life in Yorkshire." On the Saturday morning a visit was paid to Knaresborough and Aldborough. The remains of Knaresborough Castle were inspected, and the famous well. In the afternoon Ripon and Fountains Abbey occupied the attention of the party, and on Sunday, after a morning's leisure, they were conducted over the Royal Corporation Baths by the manager, Mr. Buckland.

MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY.

At a meeting of the Manchester Literary and Philosophical Society on October 17th, the members had introduced to them by Mr. Francis Nicholson, an interesting letter written by John Dalton, which Mr. Nicholson had recently become possessed of, and which he afterwards presented to the society. The letter was written before his residence in Manchester, and before he joined the Literary and Philosophical Society. It is dated, in Quaker fashion, 2nd month 20th, 1794, and is addressed to Elihu Robinson, of Eaglesfield, near Cockermouth, the person to whom Dalton owed most in his early intellectual development. Like Dalton, Robinson was a Friend, and as he is styled "Dear Cousin," was presumably a relative of Dalton's. The first paper Dalton read before the Society, one on colour blindness, is foreshadowed in this letter, which contains probably the earliest account of that peculiarity of vision. Dalton appeared as a member of the Society on October 3, 1794, and on the 31st of that month he made his scientific debut by reading a paper on "Extraordinary Facts Relating to the Vision of Colours."

Mr. H. J. Woodall communicated a paper on "Mersenne's Numbers."

A resume of a paper by Mr. S. Hirst (of the British Museum Natural History Department) on "A Collection of Arachnida and Chilopoda made in Rhodesia, North of the Zambesi," was given by Dr. H. G. A. Hickling. During the years 1904-6 Mr. S. A. Neave, acting as naturalist to the Geodetic Survey of North-East Rhodesia, made large collections of natural history specimens, complete series of which were placed in the Manchester Museum. Mr. Hirst's paper relates to the Scorpions, Pedipalpi, Solifugæ and Centipedes thus collected. Four new species are described.

REFERENCE LIBRARY SALFORD. PEEL PARK.

INTERESTING DISCOVERY NEAR BURNLEY.

Another link has been added to the history of local pre-historic man. Wrapped in a thick veil, and buried in the remote past, lie the records of the ancient races who roved over the wild, inhospitable moorlands that form part of the Pennine Chain east of Burnley. The very word pre-historic indicates that neither history nor even tradition can throw any light on their origin. Cinerary urns containing bones and implements, comprising bronze and flint implements, have been unearthed all over the district. In my earlier days, when a shepherd, I found hundreds of these interesting articles, some rudely shaped, others finely polished and fashioned into forms similar to those of our axes, knives, arrowheads, and tools of various kinds. In reference to their dates, when the remains of men are found who had no idea of the utilisation of metals, it must, indeed, be very remote.

A few days ago, accompanied by my old archæological friend, Mr. Peter Whalley, and a few other friends from Colne, I paid a visit to a cave on the summit of a hill overlooking Widdop Valley. The hill runs east and west for about a mile. The crown consists of enormous blocks of weather-beaten, rough, grit rocks, thrown in every conceivable form, at an altitude of some 1,500 feet above the sea level. On arriving at the summit we found a very rude cavern formed by huge blocks overhanging another some twelve or fourteen feet, and enclosed on each side by two other blocks of a similar character, forming an enclosure where an ordinary-sized person could stand erect. Mr. Whalley, having already made a partial survey, succeeded in discovering about 30 flint implements. Commencing to dig across the entrance, expecting to find remains of refuse cast out from the interior, we were disappointed; but, proceeding into the interior of the cave, we bared the floor, consisting of a block of rough grit rock in a horizontal position overlaid with two feet of peat. On a careful examination three flint implements were found. One was a kind of spearhead of most exquisite workmanship. Both sides were as sharp as a razor, and would answer the purpose of knife or spearhead. The other was an arrowhead, while the third was a scraper, probably used for scraping the skins with which they clothed themselves. As to what these men were or where they came from history is silent.

TATTERSALL WILKINSON.

LIVERPOOL GEOLOGICAL SOCIETY.

The first winter meeting was held at the Royal Institution on the 10th October. The Hon. Treasurer presented his statement of accounts, which showed the Society to be in a very flourishing condition. The Officers and Council for the ensuing year were elected, Mr. C. B. Travis being elected President.

The retiring President, Mr. W. Hewitt, B.Sc., A.R.C.M., after some prefatory remarks on the present position and prospects of the Society, in the course of which he commented on the satisfactory results of the amalgamation of the two geological societies of Liverpool (the Geological Association and the Geological Society), then delivered his presidential address. Taking as his subject "The Coast," he pointed out the influence of lithological character and geological structure on the form and picturesqueness of the coast-line of the British Isles, and dealt at length on the loss of land by erosion and the gain by accretion, through the agency of sea and river, around the coast of Britain, as shown by the results of the Royal Commission on Coast Erosion.

At the next meeting of the Society, November 14th, Sir Thomas H. Holland, K.C.I.E., D.Sc., F.R.S., Professor of Geology at Victoria University, Manchester, and formerly Director of the Geological Survey of India, will deliver an address entitled : "The Origin of Desert Salt Deposits."

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At the annual meeting of the Chetham Society, Colonel Fishwick, who presided, said the Chetham Society was established in 1844, and had for its first president Dr. Holme, in his day a well-known Manchester man. Dr. Holme was succeeded by Mr. James Crossley in 1847, and he held the office till his death. In 1878 the Record Society of Lancashire and Cheshire was founded, and it had frequently been suggested that the two bodies should be amalgamated. He did not agree with the suggestion, as the two societies had a distinct class of work to do—the Chetham Society being established for the publication of historical and literary remains, and the Record Society for transcribing and publishing original documents. Nothing was to be gained by joining the two together.

THE LATE MR. JOHN ALLEN.

Lancashire has lost many of her best sons in the past few years. None will be more regretted than Mr. John Allen, of Burnley, who passed away quite suddenly at the age of 51. In early life in humble circumstances, he was, after serving a term with a brewery firm, appointed caretaker at St. Matthew's Church. In September, 1888, he was appointed a school attendance officer, and at the time of his death was senior attendance officer. From his youth he developed a passion for reading, and could fairly be said to have been one of the best read men of his district. He was never ostentatious, but in all he said and did he betrayed the depth of knowledge he had acquired. He was always willing to lend a helping hand in anything which was of an educational character, and the writer has reason to know and appreciate the kindly interest he took in all striving to make progress.

The history of his native town especially attracted him. He has said himself: "No one can have wandered much in the highways and bye-ways of our local history without feeling the need of some biographical work which should trace for him—at least in outline—the lives of those men who have, each in his own way, contributed to the making of Burnley. . . Should any writer who is well-equipped for the work, ever give to Burnley a record of what its sons have done 'in the past and passing years,' he will not only help the student of local history —he will also have done something to make Burnley men feel a great and legitimate pride in their native town and in the men whose home it once was." This, to some extent, reflected his own ambition.

He had probably perused every available book dealing with the past annals of Burnley, and had made a unique collection of MSS., photographs, and rare volumes relating to Burnley's past, together with documents relating to old Burnley, and a number of family records. His knowledge of these matters made his services indispensable whenever Burnley was visited by neighbouring literary or antiquarian societies. He had a large number of lantern slides relating to Burnley and district, and from the valuable and exceptional material at his disposal he was able to compile many interesting lectures. His services were in great demand, and for the present winter season he had no less than 22 engagements. He wrote the preface to a number of catalogues which have been published in connection with the Towneley Art Gallery, giving the history of the

Towneley family, and its associations. He had taken a great interest in Towneley Hall since the formation of the Museum there, and had a good deal to do with the arrangement of the exhibits. The Old Burnley Room was under his supervision, and here he loved to be arranging the photographs and local documents ; he also lent a good number of exhibits.

He was a member of the Lancashire Authors' Association, having written much that gave him a claim to this distinction. He wrote a biography of the late Alderman Keighley, "The History of Towneley Hall," and "The Guide to Towneley." He was the author of a history of the Burnley Parish Church, and it was his intention at the time of his death to have written up the life of the late Mr. Henry Houlding.

He was connected with the Mechanics' Institute and with the Burnley Literary and Scientific Club, and was the first Secretary of the Literary and Philosophical Society, which had its headquarters at Scarr House. This was founded in 1893, and he helped considerably to place the Society in a sound position. He resigned the position about six years ago, after having assisted materially in the collection of a great deal of literary matter and of antiquities. It was through his influence that Mr. Garstang, the collector of the Egyptian antiquities presented by Lady O'Hagan to Towneley Hall, also presented the Literary and Philosophical Society with a number of Egyptian antiquities. It has been said that Mr. Allen, Mr. Thomas Booth, and Mr. Tattersall Wilkinson at one time had the best combined library in the town.

He was an earnest advocate of Co-operation, and had served on the Education Committee. He was passionately fond of rambling, and was thoroughly at home when out with parties of young men. He loved nature whole-heartedly, and he has often expressed to us his regret at not being able in face of his other work to indulge in nature study to the extent he would have liked. He was keenly alive to the loss he himself suffered on this account. We believe he was the first to throw out a hint as to the desirability of a publication such as the *Lancashire Naturalist.* This was at one of the earlier meetings held in connection with the formation of the Lancashire Union of Natural History Societies. He was one of two Burnley delegates, and he made a fine speech on that occasion. It was unfortunate that his severance from the Burnley Society should have occurred a little later, for his fine ability in organisation was thus lost to the proposed union.

He has always been held in the highest esteem by the teachers with whom he has come in contact, and by the parents upon whom he had occasion to call. He leaves a widow and five children. One son is assistant master at Heasandford School, and another is a teacher at Habergham School.

Mr. Allen was a welcome visitor always at Cronshaw's smoke room, and for many years he had been the organiser of the New Year's gatherings there.

In the course of proposing a vote of condolence to the widow and children, on behalf of the Burnley Literary and Scientific Club, Mr. W. Lewis Grant said that Mr. Allen had not the length of membership which many of their members possessed, but his membership was a real advantage to the club. He had a well-stored mind, and a remarkable gift of facile speech. When he came forward in debate, they listened to one who had something to say ; they felt in the company of one who was a master in debate, and as an antagonist he was to be reckoned with. Not only was he singularly endowed with the power of expression, but he illuminated his speeches with flashes of humour and apt quotation, and he could add pathos, satire, and sarcasm. He was an authority on matters of local history, and he was proud of his town, They in that club had always set great store upon matters appertaining to local history, from the time of their first secretary, and Mr. Allen would be greatly missed in the town for his welcome and familiar voice at gatherings in connection with schools and institutions of all kinds in Burnley and neighbourhood.

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MOUNTING DEMONSTRATIONS.

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At the last meeting of the Mounting Section of the Manchester Microscopical Society, Mr. Gordon M'Kechnie gave a demonstration of different methods of mounting in Canada balsam, and made slides of several very interesting objects. He showed how extra-thick objects may be mounted on an ordinary flat glass slip with no cavity-cell by supporting the cover-glass on tiny pieces of a pulverised slip, the balsam keeping in its place through capillary attraction.

SOME NOTES ON THE HYDROZOA AND POLYZOA.

By Joseph Smith, M.R.I.A.,
Fellow of the Royal Society of Antiquaries, Ireland.

(Continued from page 186.)

The remaining Order was the Polyzoa, which is classed now separately under the sub-kingdom Mollusca, from the fact that they possess a distinct alimentary system, and also because their tentacles are more highly differentiated, and perform the functions of gills or respiratory organs, and because they possess a nervous system in the form of from one to three pairs of ganglia. By some naturalists—Milne Edwards and Huxley—the Polyzoa are relegated to a division of the Mollusca, viz., the Molluscoida—an arrangement which has been called into question, through recent investigations—which also includes the Tunicates, sea squirts, and Brachiopoda; but Hincks describes them as *acephalous* Mollusca, "with well-developed, separated ciliated filaments, in the position of oval tentacles, mouth and anus approximate, foot rudimentary or aborted, mantle skirt absent, enclosed in a chitinous, or calcareous, or gelatinous shell, *i.e.*, the mantle shell usually forming colonies by continual germination, rarely single."

But to return to the lower type, the Hydroida, the first sub-order of the Hydrozoa; this division contains all those forms which have been placed under the sub-orders Hydridæ, Corynidæ, and Sertularidæ, by Huxley, Greene, and others, whether the hydrosoma—that is the structure as a whole—consists of a single polype, free and locomotive, or whether the throphosome—the Hydroid colony—is fixed and consists of a single polype or is constituted of several polyps connected by a cœnosarc—the source of communication between the members of the colony—with or without hydrothecæ—the polyparies in which the polyps are lodged, and in which are contained the organs of reproduction, simple processes budding from the wall—ectoderm—as in the Hydra, or gonophores or reproductive

buds containing the sexual zooids which spring from different parts of the colony. The Hydroida, or Hydroid Zoophytes, have been by Hincks further divided into three sub-orders or families—

1. Athecata,
2. Theaphora,
3. Gymnochroa,

which three divisions correspond exactly with those established by Allman and named—

Gymnoblastea,
Calyptoblastea,
Eleutheroblastea.

Gymnoblastea meaning naked buds, from *gumnos*, naked, *blastæ*, bud.

Clyptoblastea signifying covered bud, as when the generative or nutritive buds are covered by a protective receptacle, from *Kaluptos*, covered, *blastæ*, bud.

Eleutheroblastea, from *Eleutheros*, free, and *blastæ*, bud, as describing the nutritive buds, in place of being permanently attached, becoming free and enjoying an independent existence.

The order Athecata, *Hincks*, Gymnoblastea, *Allman* comprises those forms in which the gonophores are unprotected and "in some species arise from various portions of the cœnosarc, in others from the polypite." The gonophores consist of an outer covering or perigonium, and contain gonozooid or sexual zooids, and are either fixed or free. The fixed gonophores discharge their contents, whether ova or sperm cells, on the spot; the free ones do not follow this course in Nature, but continue their career and eventually enter on a separate existence as Medusiform zooids. The Tubularidæ and Eudendridæ belong to this order. In the Thecaphora, *Hincks*, Clyptoblastea, *Allman*, the gonophores are always produced from the cœnosarc, and are covered with a chitinous covering or capsule. The Sertularidæ are members of this order.

The third order Gymnochroa, *Hincks*, or Eleutheroblastea, *Allman*, contains the single family Hydroidæ, which possesses the one genus only ; the polype is destitute of any covering or polipary, and is locomotive.

The Polyzoa, the last and most highly differentiated of polyps, are by far the most numerous, and the members are always composite animals ; compared with the Hydroida they possess a much higher differentiation, as previously pointed out. The term introduced by Thompson (J. V.) is now the word approved of to designate these animals, notwithstanding the discussion which has existed amongst naturalists as to its accuracy and consequent appropriateness. Brown criticises the term as not being sufficiently distinctive, since it can be applied to the other groups with propriety. The weightiest objection which has been advanced against the employment of the word *Polyzoa* as a "*distinctive*" for this class of organisms, is based on the definition Thompson himself gives to the word, namely, "a new animal discovered as an inhabitant of some zoophytes,' and Waters (A. W.), in a paper[1] suggests that he (Thompson) used the name "to denote a polypide merely," and that to make use of it as a "*class designation would induce difficulties as attributing to it a meaning it was never intended to convey.*"

Hincks does not, however, corroborate the opinion upheld by Waters, and seems to consider it was induced through a misapprehension of the meaning of the term as used by Thompson, for he thus reviews the case[2]: "He—Thompson—used the term Polyzoa—in opposition to Hydra—to denote a distinct type of structure, which he had demonstrated, and not as the name of the single zooid." This he (Hincks) further states is evident from the following passage taken from

[1] Manchester Lit. and Phil. Society, Micro. and Nat. Hist. Sect., Manchester, 1878, and also "Annals Nat. History," January, 1880.

[2] "British Marine Polyzoa," introduction, cxxxiii.

Thompson's writings on this matter: "The Polyzoa will probably be found in many dissimilar genera of zoophytes and even mixed up with hydra in some . . and hence this discovery must be the cause of extensive alterations and dismemberments in the class with which they have been associated. . . I shall merely indicate here in a general way the whole of the Flustraceæ, in many of which I have clearly ascertained the animals to be polyzoæ," which is equivalent to stating that they exhibit a type of structure and were thus distinct from Hydræ. In a word, Polyzoa, as he uses it, is essentially a class designation, and not the name of a mere structural element.

His polyzoæ were new polypes, exhibiting a molluscan organisation as distinguished from the Hydræ; that is, they were strictly a CLASS,[1] and concludes that by making use of this term as a class designation, and altering the ending so as to bring the term into harmony with our present age" we retain all that is essential for the purpose.

As in the Hydroida some of the families are inhabitants of freshwater, so with certain species of the Polyzoa ; and moreover, while the freshwater species of the former sub-order is rendered prominent by the absence of a polipary or horny covering, the members of the one freshwater species of Polyzoa are likewise distinguishable from the others by a valve-like organ—called the epistome—arching over the mouth, and contrary to the

[1] Hincks, with the view of clearly showing the sense in which Thompson made use of the term Polyzoa, states in a note:—"The other species of Sertularia in which the animals have been determined to be Polyzoæ may . . . perhaps be referred to one genus." "The present Memoir has for its object to demonstrate another form of animal life not hitherto known, and which while it must be allowed to belong to a new type of Mollusca Acephala. resembles exteriorly in some manner the Hydra; this animal has been designated by the name Polyzoa." In this passage both Hydra and Polyzo are used to denote types of structure, and not elements of compound organism. In the prospsctus of the whole work, we find the following as the subject of the 10th Memoir: "Animals of some Cellariæ, Tubuliporæ, and Frustraceæ proved to be Polyzoæ." To substitute "polypides" for "polyzoæ" in this sentence would render it perfectly unmeaning.

prevailing feature of the freshwater Hydroids—locomotion—the entire class of Paludicella is fixed with the exception of the beautiful *Cristatella*. A still further difference exists between the Hydroida and Polyzoa, inasmuch as that amongst the former the zoecium is merely an unorganised protection for the polype or animal, but in the latter—the Polyzoa—the zoecium or cell, and the polype, or inhabitant of such cell, are vitally connected, the cell being in organic connection with its occupant, and moreover, from its being capable of retaining vitality even after the destruction of the polypidom or occupant, and the capacity of being re-occupied by fresh members of the species.

These organisms, which Hincks tabulates in the following systematic table, belong to the sub-kingdom Mollusca, being located in the branch ACEPHALA, in the class Polyzoa, which is further classed thus—

Sub-class HOLOBRANCHIA, (Ray Lankester).

Lophophore either circular or horse shoe shaped, with tentacles in an unbroken series.

Group A.—ECTOPROCTA, Nitsche.

Anal orifice outside the lophophore.

Order I.—GYMNOLÆMENTA, Allman.

Polypide destitute of an epistome (or foot); lophophore circular.

Sub-order I.—CHEILOSTOMATA, Busk.

Zoecium closed with a movable opercular valve. Ova usually matured in external marsupia; appendicular organs—avicularia and vibracula—frequently present.

(To be continued.)

REFERENCE LIBRARY, SALFORD. PEEL PARK.

THE VALUE OF PLACE-NAMES.

On the visit of the Manchester Field Naturalists to Lyme Hall, Mr. M'Donald gave an address relating to the ancient features of the district when they formed part of the Royal forest of Lyme or Macclesfield. The place-names were very interesting. Of place-names in the townships of Lyme and Disley no fewer than sixteen—that is including several modern ones and several now obsolete—refer to either woodlands or groups of trees. Six of them end with hurst, *e.g.*, Bollinhurst, Widdowhurst, Dryhurst, etc.; several refer to animal life, as Badger Clough, Deer Clough, and Wulfe Putte (Wolfpit, now obsolete; a few are personal; but the great majority refer to some particular physical feature, as clough (also spelled clowes and cluse), hough, hill, low, howe, knoll, moor, bank, dene or dean, and stream names, these being chiefly terminals of compound names, as Cock-Knoll, Jordan's Law (hlaw—low), Disley Dene, etc. The meanings of these were to some extent explained. The name Lyme is derived from Lyme as first applied to the whole forest, a name that was applied because it was situated on the limes or border of the county, only the Goyt separating this forest from the Royal forest of the Peak.

The origin of the name Disley, variously spelled in old maps and documents as Distleleigh, Desley, Dysley, Disteley, etc., has never been satisfactorily ascertained. It may perhaps be of Celtic origin, and from words represented by the modern Welsh "dws," what oozes out, and "lle," a place, with the meaning of the place of springs. In a general survey of the forest, ordered to be made in the latter part of the reign of Henry VIII., is mentioned "a comyn called Disselle, longying to Disley and Ocurley, wch is by estimation in lengthe a myle and a halfe and in bredthe a myle." Ellybank is mentioned as a part of this common. As these three places are known, it is easy to make out the whereabouts of the "comyn." The meaning given above would fairly apply to the district. Disley Hall, an old tenement, lies at the junction of Corks Lane, Wards Lane, and Spring Lane ends. Butterworth, in his "History of the Parish of Stockport," describes Disley as lying on the bank of a small stream in a deep and wooded valley (hence Disley Dene, Deyn, or Dean), and speaks of Disley Hall as being about half a mile south-east of Disley. This stream goes direct to the Goyt between New Mills and Strines.

R. TATTERSALL WILKINSON.

It is very probable, as stated by Codrington (1903) in his "Roman Roads in Britain," that the Roman road Manchester to Buxton went, after passing through Stockport, by way of Hazel Grove, High Lane, Jackson Edge, Higher Disley, &c., instead of by the very roundabout one of Bramhall Moor, Adlington, and Rainow, as stated first by Whitaker (1771) and implicitly followed by most modern writers. The road over Jackson Edge is traditionally said to be Roman, and there is good intermediate evidence in the charter by which Sir Robert de Stokeport granted Marple and Wibbersley to William and Margery de Vernon between 1208 and 1229, when that part of High Lane between Middlewood (Kartelache—wood brook) and Wibbersley formed the bound between this territory and the rest of the forest. The term used is *magnum cheminum*—"the great highway." The use of the word *cheminum* seems to imply right of way, that is through the forest, also. Absence of any record of cheminage in connection with it seems further to support that idea. There are good reasons for believing that there were many smaller connecting roads across the forest in its early days, besides the greater ones converging towards Buxton. The western bound of the forest, from a little north of Prestbury to about the middle of what is now Hazel Grove, was a road that seems to have been more or less on the site of the present Macclesfield road, so that the forest would be about five miles broad at the level of Disley, narrowing northwards to Otterspool, near Romiley, and widening considerably southwards to the River Dane.

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At a meeting of the Manchester Literary Club a paper was read by Mr. C. L. Barnes "On Aerial Sounds," in which allusion was made to the many "mysteries in the atmosphere of which neither the agency of any living thing, nor electricity, nor seismic movements offer any account." The illustrations were chiefly derived from foreign sources, but Gilbert White's "loud humming of bees" frequently heard on hot summer days, though not a single insect can be seen, was mentioned. Among one of the Cheshire ranges of hills a hollow moaning has been noticed in certain states of the atmosphere.

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The opening meeting in connection with the Lancaster Scientific Society, on October 2nd, had for the chief object a lecture by the Rev. H. Gamble, of Ormskirk, on "The Study of History."

Work and Workers.

MR. TATTERSALL WILKINSON.

Time in its progress brings many disappointments; it has also its compensations. Men come and go; some acquire instant fame, which too often declines on their passage from this earth. Some never receive acknowledgment of good work, others do not live to see their work recognised. Of the subject of our sketch it may be truly said, while recognising that he has always possessed a devoted band of admirers, that he has lived to conquer and triumph over a deal of obloquy. To-day he commands the respect of all who come in contact with him. Passing now into his 87th year, he is hale and hearty, full of vigour, and at all seasons are made constant pilgrimages to see the "Sage of Roggerham," as he is more familiarly termed, in his retirement at Lea Green, near Burnley.

The district over which our friend presides is rich in literary and historical associations; it has a rare fund of legendary lore. Naturalists of the past have here found delightful occupation: the late John Nowell and the father of our present Mr. Abraham Stansfield worked the cloughs, the ravines, and the hills with considerable success, on their various botanical expeditions. It is closely identified with the poet Spenser, and in recent years Mr. Abraham Stansfield has sung its praises.

Here, 86 years ago from October 11th, Mr. Tattersall Wilkinson was born. He was cradled here in youth, he tended his father's sheep on the hillsides as a young man, and now at a sturdy old age he presides over his beloved region, which retains all its early loveliness, and is but little changed from what it was when he first knew it. In the midst of a circle of busy industry it preserves all its old-world character and rural simplicity. A romantic mind, with a deep-rooted love for nature, could not have desired a more bountiful haven.

Very early Mr. Wilkinson developed a fondness for astronomy, and he had in these quiet fastnesses ample opportunity for gratifying his tastes in this direction to the utmost. He has lectured on the subject with ability to large and interested audiences. In the dialect of his native county he has always found a fascination, and he possessed the friendship both of the late Samuel Laycock, and of Edwin Waugh. In his work on "Memories of Hurstwood," he includes notes upon the native vernacular, as well as upon folklore, for such a nature as his could not but be affected by the legends and traditions inseparably connected with the quaint old homesteads and the wild and solitary hills.

Poetry he has always been a keen lover of, and he has in his time indulged in verse. He has delved deep into literature, and has studied history, French, and German. He was, with the late Mr. John Allen, instrumental in promoting the early success of the Burnley Literary and Philosophical Society, in whose doings he has shown the liveliest concern.

The distinguished firm of Turf auctioneers, Messrs. Tattersall, originate from his district, indeed Mr. Wilkinson is a direct descendant of the same family, and so recently as the middle of September he had the pleasure of dining with the present members of the firm on the occasion of the St. Leger at Doncaster.

He has always possessed a great fondness for antiquities, and the occurrence of many evidences of prehistoric remains in the hills about him led Mr. Wilkinson to carry out those keen observations with which his name is directly associated. In his "Memories of Hurstwood" is given an account of the discovery by him, in September, 1886, of a well-defined circle of seven rude stones in the upper part of Hell Clough. which is the more noteworthy since it is the one of the many circles that has received the recent attention of interested antiquarians.

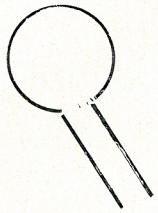
In regard to this discovery, we quote as follows :—

"In the centre of a smaller circle hard by, about three feet from the surface, was found a black carbonised mass of charcoal and human remains, but no urn. Afterwards a deep trench was dug across the first circle, and a number of loose stones covering a large three-cornered flag-stone were discovered. Beneath the flag was an urn, the examination of which took place in the presence of a number of antiquarians, including Dr. March, of Rochdale, and Mr. Abram, of Blackburn. A great number of carbonised human bones were found in the urn, among which were the jawbones of two persons, an adult and a child, together with the bones of an animal—probably a dog—and also a bronze pin, four inches in length."

Digging operations have not always been successful here, though it is conceded by those who have conducted these efforts that prehistoric remains will be still present.

These earth-circles are very common on the moors. Many of them are marked out on the ordnance maps and are called "camps," but this is obviously wrong—they are too small for camps. They date back to the late Neolithic or early Bronze Age, and are of Celtic origin.

Many of these earth-circles have been dug into, and urns have been found containing burnt human bones, together with broken flint implements and broken bronze implements. Some of these earth-circles are oriented and many have entrances. The earth-circle at Stonehenge is oriented to the rising sun on Midsummer Day. This forms an entrance, for a long avenue leads towards the circle. The banks of the avenue join the banks of the circle, thus forming one continuous vallum ; the earth-circle being broken where the avenue enters :—



All the Egyptian temples face the River Nile, and are therefore oriented towards the Nile.

There is an entrance to the earth-circle in Hell Clough. This circle may be described as follows :—Diameter of circle east and west, 55 feet ; north and south, 58 feet. Dip of land 10° south to north. Originally the circle would be true, but what geologists call a secular slip has taken place, and the circle has slipped down towards the north or lower end, and at this point there is neither vallum nor fosse.

The earth-circle was built on a tongue of land on the east side of Hell Clough, which stretches down to the Thursden Valley, in which runs the River Don from east to west. This earth-circle is therefore oriented towards the River Don. The fosse is inside the vallum. The vallum is 6 feet wide. Bottom of fosse 2 feet below top of vallum. Level of ground inside the circle same level as ground outside the circle. Entrance to circle 10° west of north and 6 feet wide.

The word "Hell" is of Anglo-Saxon origin, and signifies a covered place, the underworld, where Hel, the queen of the dead, extends her shadowy sceptre. Many speculations have been made as to the origin of and use to which these earth-circles were put, but this one fact remains : wherever they have been thoroughly examined in a scientific manner, cinerary urns have been found containing burnt human bones and broken flint and bronze implements. They therefore date back to the close of the Neolithic or the beginning of the Bronze Age, and are consequently of Celtic origin.

Grave-mounds may naturally be divided into three great periods :—The Iberic, the Celtic, the Anglo-Saxon. We have three distinct kinds of graves : the long barrow, the

round barrow, the earth circle. Then we have three distinct ages: the Age of Stone, the Age of Bronze, the Age of Iron.

Iberic = Long barrow = Stone Age.

Celtic = Round Barrow, Earth Circle } Stone and Bronze Age.

Anglo-Saxon { Used the existing round barrows of the Celts. } Iron Age.

The practice of cremation has destroyed much of the remains of the dead. On the moors above Thursden Valley are many remains of earth circles, stone circles, and tumuli.

Mr. Tattersall's birthday week was spent at Morecambe, at the Dog and Partridge Inn, Bare, with his daughter and son-in-law, and he lectured at the Devonshire Hall, Morecambe, on his actual birthday, in the midst of a round of lecturing engagements. His mind is still free, and retentive enough to enable him to speak on intricate subjects at some length without notes. He is a keen walker, and has been visited by many rambling parties, the Manchester Field Naturalists having on occasion given him a call. He writes pretty freely yet, and is at present occupied in making notes relating to his prehistoric discoveries. Antiquary, scientist, linguist, and local historian, he is at home with all men. To spend a day in his company, when he relates his experiences, gives the old dialect quips again, or to accompany him over his breezy moorlands, to see him amid his native fields and groves, and hills and dales, is indeed a pleasure. All who know him must re-echo fervently a wish expressed in a kindly appreciation of the old man penned by Mr. R. Stansfield, of Southport, since this sketch was first commenced :—"'Time at last sets all things even,' says Byron; but I may venture to express the hope that when the autumn winds once more play their annual dirge among the leaves of the forest and their plaintive melodies on the moorland ways, we shall again greet the happy, buoyant, breezy spirit yclept the "Sage of Roggerham," who presides over the destinies of the district, and who adds an interest and an attraction which will remain a memory when we are all laid in our narrow homes and numbered with the nameless dead.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

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Wild Life near Cities.

It is interesting to note how some animals linger in suitable haunts, long after the latter are swallowed up in the ever-extending boundaries of our large cities. This summer I observed the Long-Eared Bat (*Plecotus auritus*) hawking moths in the Walton Cemetery, and Hedgehogs (*Erinaceus europæus*) still occur within the city area near Aintree. The Missel Thrush (*Turdus viscivorus*) breeds annually, with the commoner and less wild species, near Walton Junction; and twice within the past few years the Meadow Pipit (*Anthus pratensis*) has successfully reared its young within the grounds of Walton Prison. These are all very common species in the country, but to the town dweller they form interesting links with the wilder life that has become a thing of the past in his vicinity.

J. A. WHELDON.

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The Convolvulus Hawk Moth.

The appearance of the Convolvulus Hawk Moth is reported from the Manchester district by an anonymous correspondent in the *Manchester City News*. Could any of your readers give authentic particulars of the capture of this moth during the present season. Dr. Ellis's work quotes this moth as being occasional only in appearance, and gives about twelve Lancashire records (Broad Green near Liverpool, Bury, Copley near Stalybridge, October, 1871, Droylsden, Aug., 1871, Fleetwood, Hale, Manchester, Middleton, 1881, Stalybridge, Stretford and Barton Moss, Southport in 1857), and half-a-dozen Cheshire records (between Birkenhead and Hoylake, Eastham Wood, Eaton Park in 1873, Liscard, New Brighton, Oxton, Wallasey). It would be interesting to have a record of the appearance in our district of *S. convolvuli*. I remember in one favourable season many years ago a fellow entomologist had a remarkable sight of this particular moth. He was in Stanworth Wood, near to the Withnell end, and was not on that day on entomology bent. Passing some shrubs in the wood, however, he was astonished to see a number of fine *S. convolvuli* flying about them. He had nothing with him to take them, but he was so bewitched at the sight they presented that he went straightway out of the wood to get something. On his return, alas! they

had vanished, and not a sight of them was ever seen more. A specimen was taken once in Sunnyhurst Wood, Darwen, by a Blackburn gentleman. Neither of these cases could be said to be in appropriate localities, but they were in direct line with the sea. Whenever there have been in the past good seasons for the Painted Lady, this district has invariably been visited, and there are one or two records of the Comma (*Vanessa C-album*), and other species which have always been held to have come over the lowlands stretching away to the sea. P.G.

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New and Rare Hepatics.

At the October meeting of the Prestwich Society, a communication was read from Professor Schiffner, of Vienna, announcing the discovery by Mr. W. H. Pearson, who is a member of the Society, of a species of Hepatic entirely new to botanical science, which he had named *Nardia paroica*, as also the discovery by the same gentleman, for the first time in Britain, of *Aplozia rivularis* Schiffn. Mr. A. Stansfield made the further announcement that Mr. Pearson had recently happened, whilst botanising in North Wales, on several plants of *Lloydia serotina*, one of the rarest of the British Alpine plants.

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Scapania irrigua Nees near Manchester.

In company with Mr. Harry Searle, the well-known Lancashire botanist, I spent a few hours in May last at Hopwood, near Heywood, and collected a number of common Hepaticæ such as *Cephalozia bicuspidata*, *Kantia Trichomanis*, *Jungermannia inflata*, and others. I was pleased to meet with in fair quantity the somewhat rare *Scapania irrigua* Nees, growing in swampy places not far from the stream.

This is, I believe, the second Manchester station known. Mr. W. G. Travis, the honorary secretary of the South Lancashire Flora Committee, informs me that he has it recorded from Brown Wardle, near Rochdale.

W. H. Pearson.

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Mr. Alfred J. Tonge, the retiring president of the Manchester Geological and Mining Society, was one of the recipients of the Edward Medal on October 9th, he being one of the first to enter the Hulton mine after the disastrous explosion.

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THE MICROSCOPIC STRUCTURE OF COAL.

Mr. J. Lomax, of Great Lever, in a lecture delivered to the members of the Radcliffe Literary and Scientific Society, on October 19th, on "The Microscopic Structure of Coal," gave his personal microscopic examination of the chief seams of coal worked in Lancashire, Yorkshire, and Staffordshire, in which he has found that in most seams the inflammable constituents can be readily detected. These occur sometimes as reproductive organs such as megaspores and microspores (seeds) of the ancient lycopodiaceous Coal Measure plants; bands of compressed leaves and other plant tissues; bands consisting of blobs of resinous-looking matter, which probably are the remains of resin given off by the trees of that period similar to those of the present day. These and many other bodies constitute the bulk of the coal, and not, as has often been affirmed by various authors, that coal is or has originated from the woody part of the stems, branches, etc., of that age. It is very seldom that any portion of a seam shows any real vascular or woody tissues except fragmentary or in the form of charcoal or mother of coal. The chief characteristics are:—Coals which in thin section show bands of intensely red or resinous matter, when ground up into fine dust are very inflammable; those that have a finely laminated structure are made up of alternating layers of megaspores and microspores (seeds). The bulk of vegetable matter which now forms the coals is composed of the droppings of the ancient plants, in the form of leaves, twigs, fruits, resinous exudations, etc., of this long bygone age. Many of the ingredients after so many ages have not lost their volatile and resinous properties which they originally possessed.

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Mr. Geo. H. Harrison, one of the inspectors of mines for the district, was elected president of the Manchester Geological Society for the ensuing year.

PRESTWICH AND PILKINGTON BOTANICAL SOCIETY.

The final summer ramble of the Prestwich and Pilkington Botanical Society took place on September 16th in weather that offered every charm ascribed to an ideal day in September. This last ramble has come to signify an annual visit to the beautiful grounds of Wallfield, Whitefield, where, on this occasion, some forty members enjoyed the hospitalities of the worthy owner, Mr. Andrew Greenhalgh, J.P., a vice-president of the institution. "Wallfield" is a charming old house, with wide-spreading, well-trimmed lawns, and a delightful old garden, in which are still to be found, in odd nooks and corners, the old garden favourites of a hundred years back; while under glass are cultivated the choicest exotics of to-day. As the place outwardly breathes an air of antiquity, so had the party of visitors a somewhat ancient cast, comprising as it did not a few septuagenarians and at least two octogenarians, including Mr. William Pickstone, late of Radcliffe, now of Kersal, who carries the burden of his eighty-nine years with a sprightliness quite remarkable. "Wallfield" would appear to have been built a couple of centuries back by a substantial yeoman of that period engaged in manufacture, and as his business extended so did his habitation, until, from a substantial cottage, it changed to a mansion; for the building of to-day is not without architectural pretensions. The "yeoman" was probably what was then called a "putter-out" as well as manufacturer, like many others in the district. In fact, the neighbourhood of Whitefield and Stand would seem to have been no inconsiderable centres of the textile industries, while Prestwich, only two miles away, was quite an insignificant hamlet, with nothing but its ancient church and its picturesque surroundings to boast of.

Whilst one portion of our botanists were occupied in exploring the somewhat extensive garden and grounds, the juniors of the party were engaged in the pleasant game of bowls on two separate greens, prizes being offered to successful players. A notable feature of the afternoon was an address by the veteran, Mr. Pickstone, in the course of which he gave, in his own graphic style, his recollections of the district and its more notable inhabitants, going back between eighty and ninety years.

An ample luncheon was served in the "portrait gallery," and the usual complimentary speeches concluded what must surely have been one of the pleasantest "rambles" even in the society's long record. S.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 196.)

23 { 1 cm., white, scales dark, radiating. (Exotic.) *L. micropholis* B.
2-4cm., scales minute. (Exotic. In hothouses and stoves.) 24
Pileus 5-12 cm. diam. 25

24 { Pale salmon, scales black, flesh red ... *L. meleagris* Sow.
Whitish, scales, ring and stem spotted red *L. biornata* B.

25 { White, globoso-plane, glabrous then breaking into *evanescent granules* ... ... *L. naucina* Fr.
White, floccose, stem same spotted yellow *L. alba* Bres.
Pileus white or disc tinged rufous, very scaly ... 26
Pileus coloured or at least with coloured scales ... 27

26 { Scales erect, stem *solid, with concentric scales* often tipped red ... ... *L. Vittadinii* Fr.
Scales overlapping, stem *hollow, glabrous*. *L. nympharum* Kal.

27 { Flesh saffron-red, pink or reddish when cut 28
Flesh white 29

28 { Pale brown, scales brown, *velvety*. sp. 5 x 3.. *L. Badhami* B.
Yellow-buff, clad with *large glabrous* brown patches, spores 18-20 x 10-12*u* *L. emplastra* Cke & M.
Whitish, concentric scales brownish-red *L. cristata* Fr.

29 { Stem scaly 30
Stem *silky* smooth; pileus white, concentric scales reddish-brown, smell unpleasant *L. cristata* Fr.

30 { Pale buff, rosy or rufescent, scales tawny. *L. clypeolaria* Fr.
Pileus rich brown or yellowish-brown... 31

31 { Pale rusty, 9-12cm., with *pointed warts* which drop off leaving *areolate marks* *L. acutesquamosa* Fr.
Without these warts; rich brown; smell strong ... 32

32 { 8-12cm., soft, scales adpressed, tomentose *L. Friesii* Fr.
5-7cm., umbonate, hispid; stem woolly scaly *L. hispida* Fr.

33 { White, 2cm, all parts crimson when touched. *L. Georginæ* W. G. S.
Without this character 34

34 { Stem dry 35
White to ochreous, 4-7cm., *stem glutinous* *L. illinita* Fr.

35 { Pinkish-tan, 10cm. ; ring large... ... *L. lenticularis* Fr.
White or pale, 3-5cm., stem scaly 36
Brownish-red (37*a*), rufescent, yellowish or rose (37*b*)

36 { Stem *silky*, odour radishy ... ... *L. medullata* Fr.
Covered with drops of water, stem *scaly* *L. irrorata* Q.

37 { *a* 3-5cm., *smooth* ; stem densely *scaly* ... *L. glioderma* Fr.
b 2-3cm., *granular*, stem *floccose* ... *L. delicata* Fr.

Leptonia Fr.

Occurring in mossy pastures and swampy places, and one species (*L. euchroa*) grows on wood. Often in troops, or gregarious. Analagous in structure to *Collybia* and *Naucoria*.

1 { Pileus even 2
Pileus more or less striate 11

2 { Apex of stem black-punctate under a lens 3
Stem apex without black points... 6

3 { Pileus umbilicate, 2-3cm. in diameter 4
Pileus not umbilicate 5

4 { Blackish-blue, *gills slate, black serrulate* *L. serrulata* Fr.
Grey, *with erect fibrils* in the umbilicus... *L. lappula* Fr.

5 { Dusky-brown, *slate-squamose*, stem dark-blue ... *L. placida*
Sooty-virgate, *glabrous*, stem brownish *L. æthiops* Fr.

6 { Gills whitish or becoming pinkish 7
Gills violet becoming pale or bluish-grey 10
Wavy, livid sooty, gills same, edge black *L nefrens* Fr.

7 { Fuscous, rugulose, papillate, 1-5cm., stem dusky *L. solstitialis* Fr.
Not rugulose, stem blue or bluish 8

8 { Greyish, umber-fibrillose, 4cm., stem blue *L. anatina* Fr.
Pileus smaller, 0.5 to 3cm in diam. 9

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9 { Blue-black, 1cm., *smooth*, gills *broadly sinuate*, stem wavy, blue-black ... ... *L. Reæ* Maire
Steel-blue or brownish, 2-3cm., *subsquamulose*, stem steel-blue, shining ... ... *L. lampropus* Fr.

10 { Purplish-blue, 1-3cm. On hazel and alder *L. euchroa* Fr.
Dark violet-slate, 2-5cm. In pastures ... *L. chalybea* Fr.

11 { Yellow, fibrillose, 3cm., stem striate, yellow *L. formosa*
Brown-green, 3cm., glabrous, stem same *L. incana* Fr.
Blue-black, 1cm., only margin striate (see leg 9) *L. Reæ*
Dusky-black, smoky or livid, 2-4cm. 12

12 { Black, slate, streaked brown, later squamulose, gills bluish, stem blue ... *L. luzulina* Fr.
Livid, *subumbonate* disc black-squamulose, stem bluish green, gills pallid ... *L. chloropolius* Fr.
Sooty-grey, *umbilicus* squamose, stem greyish, gills grey ... ... *L. asprella* Fr.

Marasmius Fr.

Many species are small and thin, growing on branches, and among leaves. The genus is allied in structure to *Collybia*.

1 { Pileus fleshy-pliant, incurved at first ; stem cartilaginous ; mycelium floccose - - 2
Somewhat membranaceous, margin *at first* straight and adpressed to the stem. Stem horny, dry ; mycelium rhizomorphoid, corticate - 22

2 { Stem *villose-downy*, *fibrous* within, gills soon free - 3
Stem *rooting*, not fibrous, tubular ; gills becoming free ; pileus thinner, hygrophanous - - - 8
Stem short, not rooting, often with a basal floccose tubercle ; gills adnexed to subdecurrent... 14

3 { Stem woolly or strigose at the base - - - - 4
Base formed of twisted fibres, naked. Not acrid - 6

4 { Smell of garlic ; yellowish, 2-5cm., edge striate, gills yellow, stem reddish - - *M. porreus* Fr.
Acrid ; without alliaceous odour ; gills brownish - 5

5 { Yellowish-brown, even, 4-7cm., stem solid *M. urens* Fr.
Pale brownish-tan, edge striate, 3-8cm., stem stuffed, densely peronate - - *M. peronatus* Fr.

6 { *Globose*, 2-3cm., white to rosy or fuscous-violaceous, stem wavy, base brown - *M. globularis* Fr.
Plane, rufescent, 2cm., gills *narrow*, *brownish* *M. plancus* Fr.
Plane, subumbonate, gills white or pale, broad- - 7

7 { Yale yellowish-brown, 2-5cm., stem pallid *M. oreades* Fr.
Whitish, 1-2cm., stem brown, nearly glabrous *M. scorteus* Fr.

8 { Stem woolly below, glabrous above ; pileus 2-3cm. - 9
Stem wholly pruinosely-velvety, at least when dry - 11

9 { Smell of garlic ; yellowish, gills *white* *M. prasiosmus* Fr.
Reddish-brown, gills *crowded*, stem reddish, containing blood-red juice - - - - *M. varicosus* Fr.
Odourless and without red juice in the stem - - 10

10 { Purplish-brown, or tan, gills reddish, stem purplish, base *red-downy* - - *M. fusco-purpureus* Fr.
Reddish-white, edge striate, stem pallid, base reddish, *white-downy* - - - - *M. terginus* Fr.

11 { Fœtid ; reddish-bay, 2cm., striato-plicate *M. impudicus* Fr.
Without disgusting odour. Pileus 1-3cm. diam. - 12

12 { Lilac-brown, stem same, 3cm., gills lilac *M. Wynnei* Bk.
Pallid, 1cm., striato-rugose, stem twisted *M. torquescens* Q.
Pale buff, centre sienna (13*a*) ; pale tan or salmon (13*b*)

13 { *a* Stem dark red, gills broad, lax - *M. erythropus* Fr.
b Stem pale red, gills crowded, linear *M. archyropus* Fr.

14 { Stem glabrous and shining above, base simple - - 15
Stem velvety or pruinose, base subtuberculose - - 19

15 { Garlic odour, rufous, 2cm., stem rufous *M. scorodonius* Fr.
Odourless. Gregarious on twigs, grass, etc. - - 16

16 { White, tinged red, 1cm., gills brownish. *M. rubricatus* Mass.
Whitish or tinged tawny, or brown, 1-2cm., gills white 17

17 { Convex-plane, even ; stem *rich brown* *M. calopus* Fr.
Convex, umbilicate, sulcato-rugose, pliant *M. languidus* Fr.
Plicato-rugose or angular ; stem brown, base blackish 18

18 { Rugose, pale ; gills *adnato-decur.*, *broad*..*M. Vaillantii* Fr.
Angular, brownish ; gills *adnexed*, *narrow*. *M. angulatus* Bk.

19 { Fœtid, tawny-rufous, 3cm., umbil. sulcate *M. fœtidus* Fr.
Odourless - - - - - - - - 20

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The Passing Hour.

The death has occurred during the month of Mr. William Balle Huntington, J.P., D.L., whose name will be held in memory by the series of lectures he established over a score of years ago under the title of the "Wm. Huntington Lectures," one of the most popular series in the North of England. For two years prior to the foundation of these, the Darwen Industrial Co-operative Society had run lectures under the Gilchrist Trust, but at the expiration of that time they were notified that these could not be continued. Mr. Huntington stepped in with an offer to provide a course of lectures, and for thirteen years he paid the entire cost of the visits of some of the finest men in the ranks of science, art, and literature. Two-thirds of the seats were free, a nominal charge being made for the remainder. In the Diamond Jubilee year Mr. Huntington endowed the lectures, and though the proceeds of this endowment were not sufficient to cover the entire cost, yet by fixing a nominal sum for the season for the popular seats and by increasing the others in proportion, the lectures have been made self-supporting.

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Sir Thos. H. Holland's lecture to the Liverpool Geological Society was a very appropriate one. Examining the origin of the saline deposits which have been formed, or are at the present time in course of formation, in the neighbourhood of the Great Salt Lake of Utah and the Caspian Sea, he pointed out that in these large inland water areas the salt deposits had originated by the concentration and precipitation of chloride of sodium, in association with other soluble minerals, which had been brought down in solution by streams and rivers, but affirmed that similar deposits could originate in other ways, as had been shown by the investigation of the salt beds of the Rajputana desert.

At the last meeting in October of the Manchester Literary and Philosophical Society, Mr. Thomas Thorp, in a short communication, suggested a new method for testing the curvature of parabolic mirrors with a delicate tangent screw, so that each portion of the mirror was successively brought into a horizontal position.

At the annual meeting of the Manchester Astronomical Society, held on November 1st, the retiring president, Mr. W. T. Hesketh, in his presidential address, dealt with the advance of astronomical knowledge during the last ten years. The most important step forward was the epoch-making discovery of radium, which was announced to the world in March 1903. Our knowledge of the remarkable properties of radium involved an entire reconsideration of the properties of matter generally, and of necessity had induced a radical change in views and hypothoses in astronomy that had hitherto been held to be axiomatic. The great progress made during the decade in astronomical science by improvements in the instruments employed in observation, in which advance some of the members of the Manchester Society had a share, was referred to.

Among other interesting matter relating to the publications of the Record Society of Lancashire and Cheshire, brought forward at the annual meeting on October 31st, it was reported that some years ago a little-known twelfth century MS., entitled "*Liber Luciani, de laudi Cestrie,*" now in the Bodleian Library, was brought to the notice of the Society by Mr. F. Madan. This MS., written by a monk of the Benedictine house of St. Werburgh, contained, with other matter, the earliest written account of Chester and neighbourhood. Arrangements were made for portions of the MS. to be transcribed and edited by Miss M. V. Taylor (Dublin), and this task Miss Taylor had now completed. It was hoped that the volume would be ready shortly.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 248.)

20 { Umber, 2cm., umbilicate, striate - *M. xerotoides* Fr.
Pallid, 2cm., even ; stem white-floccose *M. lagopinus* Fr.
Without these characters. Pileus up to 0.5cm. - 21

21 { Pale *reddish-yellow*, striate, arid - *M. amadelphus* Fr.
Wnite, *disc rufescent*, *opaque*, wrinkled *M. ramealis* Fr.
White, *pellucid*, sulcate, gills *adnexed* *M. candidus* Bolt.

22 { Stem very glabrous, shining. Pileus striate - - 23
Stem velvety pilose or pruinose. Striate or even - 28
Stemless, 5mm., shell-shaped, resupinate grey, gills few - - - *M. spodoleucus* B. & Br.

23 { Whitish, disc sienna, 7cm.; gills on a collar, stem ivory, base tuberculose - *M. torquatus* Fr.
2mm. to 1.5cm. diam. Stem hair-like, horny, coloured 24

24 { Gills attached to a *collar* near the stem - - - 25
Gills attached to the stem, adnate or subdecurrent - 27

25 { *Umbilicate*, whitish or brownish, undulato-crenate, gills white, sp. 6 x 3-4- - - *M. rotula* Fr.
Subumbonate ; gills cream ; usually on grass - - 26

26 { Pale rufous, umbo. darker, spores 3-4*u* *M. graminum* Bk.
Pale rufous, disc yellowish-sienna, spores 9 x 5-6*u* *M. Curreyi* B. & Br.

27 { Whitish, subumbilicate, stem black *M. androsaceus* Fr.
Yellowish, umbil., stem reddish ; gills subdecur. among pine leaves - - *M. splachnoides* Fr.

28 { Very fœtid (29*b*) or with odour of garlic (29*a*)
Inodorous - - - - - - - - - 30

29 { *a* Whitish or yellowish, gills adnexed - *M. alliaceus* Fr.
b White to rufescent, gills adnate - -*M. perforans* Fr.

30 { Yellowish, 1cm.; gills *adnato-decur.* *yellow*, stem floccose, bay. Bitter. - *M. caulicinalis* Fr.
White, 2mm., densely crowded on leaves, gills *fold-like decurrent* - - *M. polyadelphus* Cke.
Gills adnate or adnexed - - - - - - - 31

31 { Pileus and stem covered with *purplish hairs*. On holly leaves. - - - - *M. Hudsoni* Fr.
On a *rufescent sclerotium*, 2mm. long. White, umbil. yellow rugulose - *M. sclerotipes* Bres.
Without these characters - - - - - - - 32

32 { 1-1.5cm. diam., yellowish-brown, umbil., stem floccose, sienna, 3cm. - - - - *M. insititius* Fr.
Pileus up to 0.5cm. diam. - - - - - - 33

33 { Pileus convex, *umbilicate* - - - - - - - 34
Pileus convex or campanulate, rather papillate - - 35

34 { Pale sienna, disc star-like, even - *M. actinophorus* B.
White, plicato-rugose, stem brown - *M. epiphyllus* Fr.

35 { Whitish or brownish, *even*, stem striate, bay. On grass stems - - - *M. epichloe* Fr.
White, sulcate, stem reddish - - *M. saccharinus* Fr.

Mycena Fries.

Usually small and slender, growing on dead stumps, twigs, etc., although some ocour on the ground. Gills never truly decurrent.

1 { Stem exuding a white or coloured milk when broken 2
Stem juiceless - - - - - - - - - 6

2 { Juice white, pileus 1-1.5cm. in troops or cæspitose - 3
,, dusky-red - - - - - - - - 4
,, yellow ; 1cm. Pinkish tinged yellow *M. chelidonia.*
,, saffron. Umbo. reddish, rest olive, grey to white, 2cm. - - - - *M. crocata* Fr.

3 { Sooty-grey, striate ; gills white - - *M. galopoda* Fr.
Purple-brown, sulcate ; gills grey - *M. leucogala* Cke.

4 { Gills white, edge same. Pileus reddish or brownish 5
Gills reddish, edge darker. Pileus 1cm., reddish-brown - - - - *M. sanguinolenta* Fr.

5 { Pileus 1cm., margin entire. On cones. - *M. cruenta* Fr.
2-4cm., margin denticulate ; cæspitose *M. hæmatopoda* Fr.

6 { Gills with *darker edge*, minutely denticulate - - 7
Margin of gills not darker than the rest - - - 14

7 { Every part rose or deep scarlet. In fir woods - - 8
Not scarlet or rose - - - - - - - - 9

8 { Scarlet, 1.5cm., umbo. *acute* - - *M. strobilina* Fr.
Rose then pale, 0.5cm. Umbo obtuse. *M. rosella* Fr.

9 { Gills whitish, edge (*a*) orange or (*b*) saffron - - 10
Gills whitish to grey, edge rose, brown-purple, bluish, brownish-olive or darker - - - - 11
Gills brownish, edge crimson ; 3cm., greyish ; flesh white then red - - *M. carneo-sanguinea* Rea.
Gills purplish, edge dotted black ; pileus 2-3cm, purplish to pale - - *M. pelianthina* Fr.

10 { *a* 2-3cm., brownish-olive ; stem yellow downy ; gills adnexed - - - *M. aurantio-marginata* Fr.
b 2cm., fuscous-yellow ; gills adnato-decur. *M. elegans* Fr.

11 { Pileus (*a*) yellowish-brown, or (*b*) honey-colour - 12
1.5cm., livid-reddish ; gills *adnate* *M. rubro-marginata*
1.5cm., bluish, umbo ochraceous or pallid - - 13
2cm.. blue fibrillose on brown or greenish ground, gills grey - - - - - *M. Iris* B.

12 { *a* 3cm., gills free, edge purple - - - *M. balanina* B.
b 1cm., gills uncinate - *M. olivaceo-marginata* Massee

13 { Mid.-ochreous ; gill-edge dotted darker - *M. mirabilis* Q.
Mid.-pallid ; gill-edge bluish or reddish-flocculose *M. marginella* Fr.

14 { Stem viscid or glutinous ; gills adnato-decurrent - 15
Stem dry or moist but not glutinous - - - - 21

15 { Pileus viscid or subviscid - - - - - 16
Pileus dry - - - - - - - - - 19

16 { *Depressed*, *papillate*, brownish-grey, 6mm. *M. vulgaris*
Not papillate or depressed - - - - - 17

17 { Yellow, 3-6mm., gills white uncinate *M. citrinella* Pers.
Pileus larger, 1-2cm., with *separable pellicle* - - 18

SOME NOTES ON THE HYDROZOA AND POLYZOA.

By JOSEPH SMITH, M.R.I.A.,

Fellow of the Royal Society of Antiquaries, Ireland.

(Continued from page 232.)

The CHEILOSTOMATA include fifteen families :—The [1]AETIDÆ, Snakes head ; FLUSTRIDÆ, seamats ; the EUCRATIIDÆ, including bull's horn corallines ; CELLULARIDÆ ; BICILLARIIDÆ, including the Bugulas ; [2]NOTAMIIDÆ, shepherd's purse corallines ; CELLARIIDÆ, bugle corallines ; [3]MEMBRANIPORIDÆ, irregular spongy foliaceous corallines ; MICROPORIDÆ, CRIBRILINIDÆ ; the MICROPORELLIDÆ ; PORINIDÆ ; MYRIOZOIDÆ ; ESCHARIDÆ, to which the lepralia or scurvy zoophytes belong ; and the CELLEPORIDÆ

Sub-order II.—CYCLOSTOMATA, Busk.

Zoœcia tubular with a plain inoperculate orifice. Marsupia and appendicular organs wanting.

1. The Aetidæ with the genus Beania are ranked by Carus as a sub-order—the Stolonata—which is thus characterised :—"The conical or tubular cells ranged singly or on a tubular stolon." But the Beania and the Aetea are not closely related; the peduncles by which the cells are united in the former are by no means homologous with the creeping stems of the latter, whilst the cells themselves are of a very different type in the two genera. The Aetidæ seem to be properly ranked as a family of the present sub-order ; their stoloniferous character is not sufficient to raise them to the rank of a higher group. Amongst Eucratiidæ it is shared by the genus Eucratea, but would certainly not warrant its separation from the forms with which in other respects it is most closely allied.

2. Families 1 to 5 inclusive constitute the Cellularina of Smitt ; families 6-9 the Flustrina ; families 10-14 the Escharina ; family 15, the Celleporina. This last group has been abandoned.

3. The systematic position of one species must be considered doubtful. Its extraordinary larva allies it to Flustrella, and (in some degree) to Eucratea. Its affinities cannot as yet be determined with precision.

This sub-order comprises two groups—

1st.—The RADICELLATA, D'Orbigny.

Including the CRISIDÆ.

2nd.—The INCRUSTATA, D'Orbigny.

Containing the three other families, TUBULIPORIDÆ, HORNERIDÆ, and LICHENOPORIDÆ.

Sub-order III.—CLENOSTOMATA.

Orifice of the zoœcium closed by an operculum of setæ. Zoarium never calcareous. Marsupia wanting.

And comprises

Group I.—HALCYONELLEA, Ehrenberg.

Which embraces the families

ALCYONIDIIDÆ,
ARACHNIDIIDÆ, and
FLUSTRELLIDÆ,

Group II.—STOLONIFERA, Ehlers.

(A) ORTHONEMIDA, Hincks.

Containing the VESICULARIIDÆ,
BUSKIIDÆ,
CYLINDRÆCIIDÆ, and
TRITICELLIDÆ.

(B) CANIPYLONEMIDA, Hincks.

Containing the families

VALKERIIDÆ,
MIMOSELLIDÆ, and
VICTORELLIDÆ.

Sub-order IV.—PALUDICELLA.

A freshwater form including the PALUDICELLIDÆ.

Order II.—PHYLOCTOLÆMENTA.

Polypides possessed of an epistome, and to which belong the families CRISTATELLIDÆ and PLUMATELLIDÆ.

Sub-class.—HOLOBRANCHIA.

Group B.—ENTOPROCTA, Nitsche.

Both the orifices of the alimentary canal within the lophophore.

Order.—PEDICELLINEA.

Order only.

With families

PEDICELLINIDÆ, and

LOXOSOMIDÆ.

Sub-class II.—PTEROBRANCHIA, Ray Lankester.

ASPIDOPHORA, Allman.

Lophophore produced on each side into a process (plume), on which alone the tentacles are developed, forming a discontinuous series.

Order.—PODOSTOMATA, Ray Lankester.

Foot large, overhanging the mouth, and which order includes the one family RHABDOPLEURIDÆ.

The position the Polyzoa should occupy in the Animal Kingdom has been the subject of many discordant opinions. Leuckart and Gegenlaur classified them as belonging to the worms, Schneider and Ehlers locating them near the Gephyreæ. Rieckert considered them as being approximated to the Cœlenterates, and Barrois, though with some dubitancy, considered they had an affinity to the Rotifera. The larvæ of the latter simulate very deeply those of the Polyzoa, but the simularity is entirely lost in the adult form of the latter, which approaches so nearly the mollusca, in the possession of respiratory arrangements in the tentacles, that they have been located under that genus. The simplest form of zoophyte is the Hydra, common in ponds and ditches, attached to floating confervæ, and devoid of the chitinous or horny covering which is noticed in the members belonging to the other groups, consequently it offers a suitable object for examination. The body* consists of a delicate gelatinous tube contracted at one extremity, which is terminated by a minute sucker, and furnished at the opposite end with a number of tentacles, cilia, or filaments which are contractile, and placed around the opening representing the mouth. The body consists of a

* "On the general structure of the Animal Kingdom," p. 21, Rymer Jones.

granular substance usually of a greenish hue, the granules being generally connected by a semi-fluid of albuminous matter; no trace of further organisation, either veins or vessels or organs of reproduction are discernible. Another naturalist† describes the Hydra as possessing a body which consists of a "homogenous aggregation of vesicular granules held together by an intercellular substance, and which is capable of great expansion and retraction."

The more comprehensive view of the animal is, that it consists of a gelatinous body, the one end of which called the proximal is distended in the form of a disc or foot, the upper or distal end carrying the mouth and tentacles. The substance the body is composed of is termed sarcode, which consists of two layers—the ectodermic or outer layer, and the endoderm or inner layer, which is composed of two classes of vacuolated cells, large conical ones and round ones. It is from this layer the tentacles surrounding the mouth or hypostome spring, which by their constant motion in the search of food, cause a circulating motion in the liquid contents of the sac, and which circulation, Weissman contends, is also assisted by the pulsation of the body wall.‡

It has, moreover, been shown by Metschnikoff that there exists in the endoderms of many of the Hydroid polypes, and other Cœlenterata, cells possessing the power of exuding processes of protoplasm, which absorb extraneous substances, appropriating and incorporating them, and in the case of particles affording nutrition of digesting them within the cell wall. This intracellular digestion may be clearly noticeable in those examples which have exerted their protoplasmic absorbing powers and affiliated whole colonies of Diatomaceæ, the siliceous frustrules of which can be seen embedded in the walls of the endoderm.

† Hogg, "The Microscope," p. 470. ‡ "Zool, Angeig," iv., 1881, pp. 61-64,

Notes from Periodical Journals.

In the *Revue Bryologique* for November, Mr. H. N. Dixon describes an extraordinary abnormality of the capsule of a moss from Darjeeling, *Acanthocladium laxitextum* Ren, el Card. Attached to the base of the capsules was apparently a spur of variable length. Investigation showed that this was really a strip of tissue torn from the seta. Mr. Dixon discusses various hypotheses which might lead to an explanation of the phenomenon, the favoured theory being that unequal torsion of a seta (consisting of both positively and negatively-twisting tissue) might account for the production of this abnormality.

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Dr. C. E. Moss, in the November *Journal of Botany*, introduces us to a new scheme of "Botanical Divisions of the British Islands." We hold no brief for the Watson vice-comital divisions and provinces, but they are well understood and followed by both botanists and zoologists. It seems, therefore, that a new arrangement should be very carefully considered and submitted to workers in the two great biological kingdoms before adoption. It would only render confusion worse confused to have two series of numbers running at the same time.

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Dr. F. N. Williams, in the same Journal, describes two new forms of *Viola tricolor* of the *Curtisii* series, under the names of *Viola Tricolor, var. sabulosa, forms discolor and concolor.* Dr. Williams seems to have good reason to argue that *V. sabulosa* has never been recorded on satisfactory evidence as a British plant, our coast plants belonging chiefly to *vars. Pesneauii* and *Curtisii.* Colour forms in the Melanium section of Viola should be regarded as of very little importance, however, and it is doubtful if these forms of *var. sabulosa* are of more value than those of other species of the group, where one or more colour-forms may be found on a single root, and where early and late flowers differ remarkably in colour and size.

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Mr. H. N. Dixon records *Leptodontium recurvifolium* for a locality in the Lake District. This Atlantic type moss had not previously been recorded for England, although known from Scotland, Wales, and Ireland.

In the *New Phytologist* for May and June, recently published, Mr. A. E. Lechmere has an article on "Further Investigations of Methods of Reproduction in the Saprolegniaceæ," which exhaustively treats on the life history, reproduction, and classification of this family of Fungi, including a tabular key to the species of the genus *Saprolegnia.*

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In the same magazine there is an article on the "Life History of the Plum Rust in England," by F. T. Brooks, M.A., detailing experiments which prove that the Æcidium on *Anemone coronaria* is the alternate phase of the Plum Rust, *Puccinia pruni* Pers. The experiments were made on young "Victoria" plum trees.

In the *Zoologist* for October Mr. Fredk. J. Stubbs has a paper on "Observations on the Nocturnal Habits of the Redwing." In this Mr. Stubbs gives his own views upon what various writers describe as migratory movements, but which he himself believes are simply due to the curious habit the Redwings have of roaming about at night. He deals in a very concise way with this subject, stating that "from the time of the bird's arrival in autumn to the end of December, and afterwards at irregular intervals until April, a large number of Redwings are on the wing each night, and frequently make journeys of at least several and probably many miles. We never see them, and only know of the passing of the birds by their voices." Allusion is made to the shrill "seep" which at night alone is used. Mr. Stubbs give his extensive personal experience, and after relating the sensation experienced on hearing the birds passing over busy London, where they are to be observed only at night, and suggesting the immunity of this bird from disaster on the wires, he goes on "The Redwing alone among its kindred passes the night in mysterious wanderings. The habit is not well-known to the present-day ornithologist."

The October number of the *Journal of Conchology* contains a continuation of J. T. Marshall's "Additions to British Conchology," part vii. There is an allusion to *F. propinquus* Ald. at Birkdale (Heathcote). L. E. Adams contributes "Conchological Notes from La Plata, Durban, and Bombay"; He is represented also by a critical paper on "*Vitrina hibernica* Taylor and Jeffreys' Varieties of *Vitrina pellucida* Müller." The Rev. Canon J. W. Horsley presents the first instalment of a copious index he has compiled relating to the notes on the

British Non-Marine Mollusca in vols. i-xii. W. Gyngell deals with the colour and band variations as well as the distribution of *Helix nemoralis* and *H. hortensis*. "A Prehistoric *Cypræa tigris* L. in Hants" is described by J. R. le B. Tomlin, and there is the usual interesting Bibliography and Proceedings.

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The *Naturalist* for November contains an elaborate article on "The Relation of the present Plant Population of the British Isles to the Glacial Period" by Clement Reed, F.R.S., F.L.S., F.G.S.; "The Uredineæ" by R. H. Philip. Mr. C. Crossland describes the Fungus Foray at Sandsend; *Trombidium buccinator* is contributed by C. F. George, M.R.C.S.; and there is an article on "Annelid Bionomics" by the Rev. Hilderic Friend, F.LS., F.R.M.S.

MANCHESTER FIELD NATURALISTS.

The concluding ramble for the season of the Manchester Field Naturalists took place on October 21st to Staley Brushes. Mr. Abel Bottomley acted as guide, and from the station at Stalybridge the car to the Mottram terminus was taken, from whence the party proceeded over the "Cutting," past Hollingworth Hall, and uphill to North Britain hamlet, returning by the Brushes Valley to Millbrook, where the car was taken to Stalybridge. The flora met with was chiefly of the usual type of the moorlands, though the ferns and lichens excited some attention. The address of Mr. M'Donald after tea made special mention of the derivation of place-names from botanical features—Cowbury Clough, Featherbed Moss, Whinberry Moss, Hollybank, Thorncliff, Ashes, Bents, Flaxfield. Woodlands provided many names—Micklehurst, big hurst; Swineshaw, the shaw or wood that was frequented by, or produced food for, swine; Shaw Moor, Kershaw (car shaw), the swampy shaw; the Hurst; the Brushes, etc. The name Brushes would no doubt have been applied originally to the low-growing thickets on the hillside—brushwood, rough, low, close thickets; brush, a collection of twigs or bushes, or a thicket. A number of the place-names derived from physical features were also dealt with.

LANCASHIRE AND CHESHIRE ANTIQUARIAN SOCIETY.

At the meeting of the Lancashire and Cheshire Antiquarian Society on Nov. 10th, Mr. C. E. Higson showed a curious old globular bottle of dark green glass, having impressed upon it a circular glass seal bearing the words I. Moss, 1717. Mr. Phelps exhibited a Peruvian vase having painted upon it in two colours the Swastika symbol dealt with by Dr. Carr at the previous meeting. Mr. Albert Nicholson displayed a church token, a small square tablet of pewter, one side of which was plain and the other side bore a circular ornament and the letters A.C.K. (the initials of the Associated Church of Kilmarnock), and referred to a period before the Scottish Church was united. It bore also the initials of John Robertson (J.R.), a minister who was contemporary with Robert Burns and with Dr. M'Kinley, who was the hero of Burns's poem "The Ordination"; he preached in the parish church of Kilmarnock. It was the practice of the elders to deliver the tokens to those considered to be fit to attend at the communion. Miss Law exhibited a Roman coin (second brass Emperor Domitian) found in North Wales, and an electrotype reproduction of a Roman agate found in Pompeii.

A paper was read by Mr. Ernest Axon on the two Alexander Greenes, who were postmasters of Manchester in the seventeenth century. The father was a prosperous innkeeper in Manchester and a prominent burgess, being constable and churchwarden. He had also interests in Liverpool, being a freeman, and was lessee of the Tower in that place. The son of the same name was, until his father's death, a merchant in Liverpool and a member of the Corporation, being Mayor in 1660. He returned to Manchester, and was postmaster for a few years before his death in 1666. Two interesting documents in connection with the Greenes were referred to by Mr. Axon, one containing a list of the rooms in the Eagle and Child Inn in 1666. Some of the rooms were very quaintly named. Two of them, being named the Old Exchange and the New Exchange, suggest that in the seventeenth century the Manchester merchants met there for business purposes.

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A Society has been formed in Manchester under the title of the Manchester and Salford Morris and Folklore Society. The object is to revive interest in old English songs, folklore, morris dances, and games.

CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

The members of the Manchester and Leeds Branches of the above Society held their fifth annual joint ramble at Ilkley, where a visit was paid to a well-known local habitat at Cockin End Wood for the white variety of *Azeca tridens*.

The weather, as at the past joint meetings, was of the best for this period of the year, but too dry for the most active investigation yielding good results. On arrival the ground was found in a parched up and dusty state, although situated low down near the river, and after a spell of turning over leaves and other decaying vegetation likely to produce this shell, it was soon apparent that if any specimens were to be secured some hard work would have to be done. Examples of the type shell of *Azeca tridens*, along with *Hyalinia helvetica* and *H. pura* were noted, but these were not in quantity, as they would have been under moister conditions. However, several of the party were eventually rewarded by securing examples of the white form. A few specimens of another good local shell were secured, *Hygromia fusca*, although had the conditions been more favourable this species, which is fairly common here, would have turned up in numbers. A good few species were noted during the visit, but no additions were made to the list already recorded for this part. *Ena obscura* was noted on walls on the road side, and also in the wood on the river side, but the greater part of the specimens were immature. A large form of *Clausilia bidentata* also occurs commonly here, but very few were seen on this occasion. Several of the small occurring here were very scarce, and the conditions may be judged when slugs, of which about ten species infest this part, were practically absent. A return was made along the river side, and the wooded part produced several species of land shells. Beds of nettles or any boggy ground gave the best results. *Hygromia hispida*, *granulata*, and *rufescens* were noted, but, like all other species, were scarce in number. Beetles, woodlice, centipedes, and spiders also came in for some attention by several members. Altogether 20 species of Mollusca were noted during the day, which may be considered a favourable list after so dry a time. Those members who had not previously visited Ilkley and its immediate neighbourhood were full of praise for its sylvan beauty and the many charming views obtained, and expressed themselves fully repaid by their visit to this part of Wharfedale. There was no time to do further work after tea, and it was decided before parting that the next annual joint ramble should be at Grange-over-Sands.

F.B.

LIVERPOOL BOTANICAL SOCIETY.

The November meeting was held in the Hartley Botanical Laboratory on the 13th inst., Dr. J. W. Ellis, F.E.S., presiding. A specimen of *Catalpa*, grown near Portishead, Bristol, was exhibited by Mr. A. A. Dallman. The long stiff, branch-like pods with numerous seeds, formed a distinctive feature which Mr. Dallman stated was rarely produced in this country. A series of beautifully executed water colour sketches of Cheshire Fungi was shown by the Chairman, who described the structure and characteristic features of some of them in a useful and instructive manner. Two at least of the species, *Leiotia lubrica* and *Cortinarius elatior*, are decidedly rare, if not absolutely new to the district Flora. They were found by Dr. Ellis between Willaston and Ness. Mr. J. A. Wheldon called attention to a paper in *Journal of Botany* on the sandhill Pansies, and suggested that *Viola sabulosa* should be sought for on our coasts. The only forms found on the Lancashire Coast hitherto were *V. Curtisii* and *V. Pesneauii*. Mr. W. G. Travis exhibited specimens of one of the rarest of European hepatics, namely, *Adelanthus dugortiensis*. He made some remarks on its distribution and affinities, and the circumstances of its discovery. It is only known as occurring in Achill Island, off the West Coast of Ireland, where it was discovered a few years ago by Canon Lett, and had not been seen again until last August, when it was found by a small party of members of the Moss Exchange Club. An addition to the South Lancashire Hepatic Flora was also announced by Mr. Travis in *Lophozia bantriensis*, recently found by Messrs. Ritchings, Long, and Sutcliffe in the Wolverden Valley, and a specimen was exhibited. A letter was read from Mr. H. J. Wheldon, apologising for his inability to be present to read his paper on the "Colonisation of Fungi," but expressing his thanks to Mr. A. A. Dallman, not only for having undertaken that duty for him, but also for supplementing the illustrations by additional interesting slides of Fungi. The paper itself dealt with the means of dispersal adopted by these plants both in the vegetative and sporiferous stages of growth; the part played by the wind, insects, and other animals, and various mechanical and structural devices which had been evolved, were explained and illustrated. After some appreciative remarks from the Chairman on the subject-matter of the paper, on the motion of Mr. Waterfall, F.L.S., seconded by Mr. Delaney, a cordial vote of thanks was accorded to Mr. Wheldon.

LIVERPOOL GEOLOGICAL SOCIETY.

A large audience favoured the November meeting of the Liverpool Geological Society, held in the Royal Institute, Colquitt Street, when Sir T. H. Holland, Professor of Geology, and Director of the Geological Laboratories, Victoria University of Manchester, gave a lecture upon "The Origin of Desert Salt Deposits." The President of the Society, Mr. C. B. Travis, occupied the chair.

In introducing his lecture, Sir T. H. Holland said there were various reasons for considering the subject he had chosen suitable for discussion by that Society. Questions connected with salt must in any case cause a certain degree of interest in a city which was the principal Channel of English export. Apart, however, from that, the geology of our main salt-bearing formations in this region had been largely worked out by members of that Society, conspicuous among whom was one of their past presidents (Mr. Joseph Lomas), who was killed during a journey in Algeria, whither he had proceeded with the intention of tackling the very problem to be considered that night, viz., the influence of modern desert conditions on the geological features presented by the Triassic salt-bearing formations of this part of England. The inquiry into the salt resources of Rajputana was commenced in 1903, and received a new impetus in 1906 in consequence of the work of Mr. Lomas, who in that year laid before the British Association at York his views regarding the occurrence of characteristic desert phenomena among the British Triassic rocks. In laying the results of their investigation before that Society, that lecture became in effect a memorial to one of their most distinguished members, and one of the best of his (Sir T. H. Holland's) old friends, whose birthday they would be celebrating this week if he had lived.

The lecture, which was profusely illustrated by lantern views, was then proceeded with, and contained much information for the practical geologist.

Mr. W. Hennessey Cook gave a lecture on Nov. 14th in the Association Hall, Mount Street, Manchester, descriptive of the vast resources of Canada, drawn from a recent tour compared with a journey made in 1891. The lecture was under the auspices of the Manchester Geographical Society.

REFERENCE LIBRARY SALFORD PEEL PARK

Work and Workers.

MR. J. A. WHELDON, F.L.S.

Of all our workers in Lancashire at the present time, no one is more respected than Mr. J. A. Wheldon, F.L.S., who is both a clever and a critical botanist and at the same time one of the most affable of men. He holds a unique place in the esteem of Lancashire botanists, and his work has been both original and striking in its value. He is respected by a large circle who have had occasion to consult him with regard to their own work. To these he has always extended a helping hand, and ever with a courteousness and a cordiality that have almost persuaded them of his and not their own indebtedness for the opportunity.

Mr. Wheldon was born at Northallerton, Yorkshire, in 1862. His education was chiefly gained at the Cleveland College, Darlington. The choice of a profession having rested upon pharmacy, he was prepared for his pharmaceutical examinations at the Westminster College of Pharmacy, London, and qualified as a Pharmacist about 1884. In 1886 he set up a business in York, and opened out very successfully. But four years had elapsed when he unfortunately lost almost everything in a disastrous fire on New Year's Eve, 1890, in which the premises were gutted, and a fine collection of living and stuffed wild birds, as well as his collection of plants and books, were consumed in the flames. He had been an enthusiast in nature study from his youth, but from this time plants became his chief hobby, although he did considerable work in entomology, and made an interesting collection of birds' eggs, and later one of British land and freshwater shells. He was a clever hand at taxidermy also at this period, to which he devoted much attention, and used to make realistic cases of stuffed birds and animals in natural haunts. He lived for some time at Scarborough, where he studied and made a collection of

seaweeds, and also of Leaf-Fungi (Uredinales), and from the latter many records were obtained for the *Yorkshire Fungus Flora.*

In 1891 he was appointed Dispenser to H.M. Prison at Liverpool, a position which he still holds to-day.

Botany was now his chief hobby, and having so far centred his study in the Phanerogams, he turned his attention more especially to Mosses, in which he has been very successful.

He became Secretary of the York and District Field Naturalists' Society, and in 1896 was one of the founders of the Moss Exchange Club, an institution which has been of considerable practical benefit to its members as well to those outside its influence, and he has acted as Treasurer and as a Referee ever since. He has fulfilled official duties always with cheerfulness and with close attention, and his success in all positions has led to his frequent selection. He was for several years a member of the Liverpool Naturalists' Field Club, and was a foundation member of the Liverpool Botanical Society, formed in 1906, of which Society he has been twice President, and is at present on the Council, and a member of the South Lancashire Flora Committee, whilst he has been for several years a member of the Yorkshire Naturalists' Union.

In January, 1901, he was elected a Fellow of the Linnæan Society of London, an honour which has been warmly approved of by those who know him.

Having become an expert on Mosses, especially on the group *Harpidia*, he has of recent years devoted much time to the systematic study of Lichens, and in conjunction with his son has taken a considerable interest in Fungi. It is perhaps of interest to know that Mr. Wheldon has the unique distinction of having acted as Distributor of all three of the leading British Exchange Clubs, viz., Mosses, Lichens, and Phanerogams.

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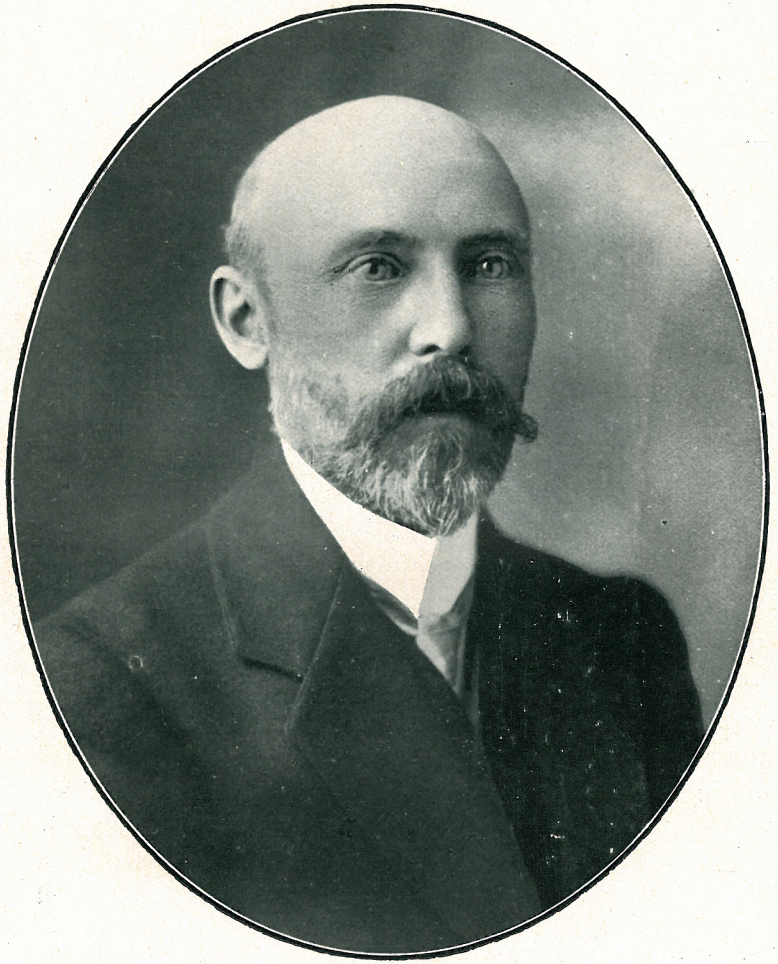

MR. J. A. WHELDON, F.L.S.

(Reproduced by kind permission of the Liverpool Botanical Society.)

Since his introduction to Lancashire Mr. Wheldon has spared no pains to make himself familiar with its flora, indeed few persons have a more intimate acquaintance with it. Perhaps the most noteworthy result of Mr. Wheldon's Lancashire work is the *Flora of West Lancashire*, executed in conjunction with Mr. Albert Wilson, F.L.S., a work which has received the highest praise and admiration, and has been stated by many botanists to be one of the most capable botanical works ever compiled. In addition to this, he helped with the Botany in the *Victoria History of Lancashire*. He also contributed to Green's *Flora of Liverpool*, and on the occasion of the visit of the British Association to Southport in 1903 he wrote an account of the Mosses and Hepatics of the Southport District. He contributed records to Baker's *North Yorkshire*, and an article on Lichens in Morey's *Guide to the Natural History of the Isle of Wight* was from his pen. His work in critical Botany has been as varied and indefatigable as it has been valuable. He served on the Editorial Committee which published the *Census Catalogue of British Mosses* for the Moss Exchange Club.

He is taking an active part in the compilation of the South Lancashire Flora which is being undertaken by the Liverpool Botanical Society.

He was to have accompanied the members of the International Phytogeographical Excursion on their visit to Southport, but illness deprived him of this privilege. His name is announced as the Distributor and Editor for next year of the Botanical Exchange Club report.

He loves to ramble on the fells and in the country lanes such as are to be found in various parts of Lancashire, and he frequently tramps 20 to 30 miles through such localities, generally returning with heavy bags of specimens, and he gives many hours to the microscopical examination of his finds. He has a pleasant disposition, and a congenial word for everyone, and he makes fast friends of all who are privileged to go out into the field

with him. Much of his time is given to assisting local botanists who require to have their specimens named or to ask advice on botanical matters—in fact, one local botanist very aptly referred to his house as the 'Mecca' of all local botanists. His work in the encouragement of student botanists has been valuable, and it is rarely indeed, if ever, that one seeking advice either personally or by letter, is sent empty away.

At the present time Mr. Wheldon is engaged upon two works on Lichens, one in conjunction with Mr. Albert Wilson and the other with Mr. Travis, but these will probably be interfered with by the Exchange Club work. This in itself is a great work, as may be judged when no less than 4,000 or 5,000 plants will pass through his hands. We append a

LIST OF PAPERS, ETC.

1886 "Wild Flowers of the Week." Series of Articles in the *Yorkshire Chronicle.*"

1888 "York Catalogue of British Mosses."

Various Dates. { "On Colouration of Birds' Eggs." *Science Gossip.*
"Spirals in Plants." ,, ,,
"Subspontaneous Mosses." ,, ,,
"Casual and Alien Plants." ,, ,,

1897 "Variations in Erythræa" (illustrated) ,, ,,

1898 "The Mosses of Cheshire." *Journal of Botany.*

1898 "The Mosses of South Lancashire." ,, ,,

1899 do. do. ,, ,,

1899 *"The Mosses of West Lancashire." ,, ,,

1900 *"Additions to the Flora of West Lancashire." ,,

1900 "Mosses of the Mersey Province." *The Naturalist.*

1900 *"Notes on the Flora of Over Wyresdale." ,,

1901 "Elgin Mosses." ... ... *Journal of Botany.*

1901 *"Mosses of West Lancashire.' ,, ,,

1901 *"Additions to the Flora of West Lancashire." ,,

1902 "The North of England Harpidia (illustrated)." *The Naturalist.*

1902 *"West Lancashire Plants." ... *Journal of Botany.*

1902 *"Additional West Lancashire Mosses and Hepatics... ... ... ,, ,,

1903 *"*Kantia submersa* in Britain." ,, ,,

1903 "Mosses of the Southport District." *British Association Handbook* (Southport), 1903.

1903 "Hepatics of the Southport District." ,, ,,

1904 *"West Lancashire Lichens." *Journal of Botany.*

1905 "A Gemmiparous Pterigynandrum." *Revue Bryologique.*

1905 *"Additions to the Flora of West Lancashire." *Journal of Botany.*

1906 * ,, ,, ,, ,,

1907 **The Flora of West Lancashire* (illustrated).

1907 †"The Hepaticeæ of South Lancashire." *Transactions of the Liverpool Botanical Society* (1909).

1908 ††"A New Variety of *Sagina Reuteri.*" (Illustrated.) *Journal of Botany.*

1908 "Comments on the *Harpidia adunca* of Sanio." *Revue Bryologique.*

1908 *"Inverness-shire Cryptogams." *Journal of Botany.*

1909 *"A New Lichen from Lancashire." *Transactions Liverpool Botanical Society.*

1910 "Flora of the Manx Curraghs." *Lancashire Naturalist.*

1910 "On some additions to the Manx Sphagna." ,,

1910 "Lichens." *Guide to the Natural History of the Isle of Wight.*

1910 "Marratt's Collection of British Mosses." *Journal of Botany.*

1910 "New Lancashire Cryptogams." *Lancashire Naturalist.*

1910 "New Lancashire Lichens." ,, ,,

1910 *"Inverness and Banff Cryptogams." *Journal of Botany.*

1911 "Social Groups and Adaptive Characters in the Bryophyta." (Illustrated.) *Lancashire Naturalist.*

* With Mr. Albert Wilson.

† With Mr. W. G. Travis.

†† With Mr. W. Ingham.

MANCHESTER MICROSCOPICAL SOCIETY.

The full exhibits at the annual Soiree of the Manchester Microscopical Society, which were too late to appear in our last number, were as follow :—Marine and freshwater plankton, Messrs. Flatters, Milborne, and McKechnie, Ltd.; living ants, Mr. H. G. Willis, M.A.; *Coscinoscera Hercules*, silk moth: hybrid silk moth larvæ ; a unique gynandromorphous silk moth, *Antheria mylitta*; and beautiful butterflies, Mr. John Henry Watson. Messrs. Flatters and Garnett, Ltd., supplied marine zoological specimens, and Mr. A. Binns had a curious collection of plants, included in which were *Drosera rotundifolia* (Sundew), *Hyoscyamus niger* (Henbane), *Mirabilis Jalapa* (Marvel of Peru), *Atropa Belladonna* (Deadly Nightshade or Dwale), *Solanum Dulcamara* (Woody Nightshade or Bittersweet), *Datura stramonium* (Thorn Apple), *Phytolacca decandra* (Poke Plant), *Amaranthus caudatus* (Love-lies-bleeding), *Senecio Jacobæa* (Ragwort), *Humulus lupulus* (Hop), *Calluna vulgaris* (Ling), *Erica Tetralix* (Cross-leaved Heath), *Melilotus officinalis* (Common Yellow Melilot), *Mentha aquatica* (Water Mint), *Artemisia Absinthium* and *A. vulgaris* (Wormwood and Mugwort), *Viburnum Opulus* (Guelder Rose), *Phœnix dactylifera* (Date *Ambrosia trifida* (Great Ragwort), and various grasses and fungi. In the purely microscopical objects Mr. Henry Garnett, F.C.S., exhibited living bacteria under dark-ground illumination, Leitz apparatus ; Messrs. Flatters, Milborne, and McKechnie, Ltd., free swimming organisms in oceans, lakes, and rivers ; diatom, *Arachnoidiscus japonica*, in situ, from material used by the late Dr. Carpenter, in preparing the plate to illustrate his great work on the microscope, was shown by Mr. Abm. Flatters, F.R.M.S.; mosses, Mr. H. G. Willis, M.A.; slides illustrating structure of mosses and hepaticæ, Mr. H.C. Broome ; varieties of Batrachospermum and other algæ, Mr. Chas. Turner, F.C.S.; special dry mount of foot of beetle, *Dytiscus marginalis* and foot of Brazilian spider, Mr. John Eastwood ; Noctilucæ, Mr. W. A. Rogerson ; marine plankton, tow-nettings Port Erin and Naples, young crabs and barnacles, Mr. E. C. Stump ; living plankton, from English Channel, Radiolaria, young star fishes, algæ, and diatoms, Mr. A. P. Bradshaw ; micro-organisms in drinking water, Mr. E. Batty ; mouth organs of insects, Mr. B. Clayton ; various Pycnogonids, Mr. Albert Newton ; fluid crystals (Ammonium oleate), Mr. J. H. Shorrocks ; sections of carboniferous flora (fern stems, calamite stems, cones, and spores ; silicified pine from Lough Neagh, with recent pine and wood pulp to show pitted ducts), Mr. Robt. Pettigrew, F.C.S.; rock sections, &c., Borrowdale, T. section of spinal cord, Mr. G. H. Meek.

Microscopes and accessories were exhibited by Messrs. Thos. Armstrong and Brother and by Messrs. Jas. Woolley, Sons and Co., Ltd.. Messrs. Flatters and Garnett, Ltd., had on view new series of lantern slides, a new killing bottle for petrol, etc., a new geological note book, and a great variety of microscope slides. Microscopes, cabinets, apparatus, collecting and mounting requisites were the exhibits of Messrs. Flatters, Milborne, and McKechnie, Ltd.

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Mr. Samuel Warburton, of Prestwich, who died recently, in his seventy-seventh year, was a member of the Manchester Literary Club, to which Society he was elected so long ago as 1874. He was particularly interested in the dialect of his native county, being a thorough-going Lancastrian, and he had contributed many interesting dialect words to Professor Joseph Wright's "Dictionary of English Dialect Words." He was a member of the Lancashire Parish Register Society, and was possessed at one time of one of the finest private libraries in the county, composed mainly of works relating to antiquarian subjects, folklore, old Manchester, dictionaries, glossaries, church registers, etc. A builder and contractor by profession, being concerned in the erection of many fine public buildings, he was also a competent judge of coal seams.

The Accrington Naturalists passed a motion at one of their meetings having reference to the late Mr. Robert Wigglesworth. The Society desired to gratefully recognise his life and work. For a period of 60 years and upwards he had associated himself with the work of the Society. "His early enthusiasm helped to give it birth ; whilst his consistent application to its aims and aspirations, and his zeal for its reputation as an agency to uplift his contemporaries into those realms of inquiry bringing intellectual stimulus and unalloyed pleasure, inspired him through days of disappointment and discouragement to protect it to manhood and usefulness." They were glad he was fortunate in being able to discharge the duties of his office as curator until his last days.

MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY.

At a meeting of the Society on October 31st, Miss P. C. Esdaile read an excellent paper in which reference was made to the attempts to solve the many problems connected with the salmon. The title of the paper was "A Study of the Scales of the Salmon," and it was shown how scientists and others have been studying the scales of the fish for this purpose. These, to one who knows their language, are like the pages of a book, and Mr. H. W. Johnston and Herr Dahl have given us clues by means of which we are able to read the story told by the scales. Further research during the past year has shown that no two scales of many scores examined from the one fish have the same number of lines, though they all have the same number of annual markings. The results indicate that the number of lines in each annual group increase gradually on scales taken from near the head to those taken near the fleshy (adipose) fin; and then from this position to the tail there is a decrease in the number of lines, also the scales on the upper side of the body have fewer lines than the scales on the lower side. Thus the scales of the Salmon are not all of the same size; as the number of lines increases, so does the length and breadth of the scale. This brings us to the curious fact that near the adipose fin, which is the part of the fish with very nearly the smallest girth, the scales, so far as we know, are longest and broadest, and have the greatest number of lines. The results of the investigation clearly indicate that as yet it would be premature to state how many lines are formed during each year, or each month.

The importance of Miss Esdaile's work was shown in the ensuing discussion, in which Professor S. J. Hickson and others took part, and the need for further investigation upon the same lines was emphasised.

At a meeting of the Manchester Literary and Philosophical Society, on November 14th, a paper was read by Dr. Alfred A. Mumford entitled, "Observations on some factors which have caused the improved physique of boys at the Manchester Grammar School during the last thirty years. From tables drawn up from the school records, the differences in height, weight, and the physical development generally of the boys at the school during a period 1881-86 as compared with a period

1905-10. The causes to which he attributed the remarkable increase in height and weight of the boys—better housing, improved diet, greater insight into the meaning of parental responsibility as regards health, &c.—were discussed, and reference was also made to the changed attitude towards athletics and physical culture prevailing to-day. Dr. Mumford drew attention to the fact that, from the statistics he put forward, it appeared that the later the onset of infectious disease can be postponed beyond the earliest years of childhood the better. He stated that more than fifty per cent. of the boys with defective eyesight he examined had suffered from throat trouble or had some serious infectious disease before reaching five years of age. A prolonged discussion followed.

An abstract of a paper by Mr. Lancelot V. Meadowcroft on "A geometrical treatment of geodetic torsion," was given by Mr. R. F. Gwyther, who with Professor Horace Lamb made favourable comment upon the communication.

LEPIDOPTERA OF BLACKBURN AND DISTRICT.

At the annual meeting of the Blackburn Field Club, on Nov. 9th, Mr. W. H. Western, who was re-elected President, gave as his presidential address a "Chat on Butterflies and Moths," with special reference to the local species, which were with the exception of the Whites, mainly decreasing. The 19 species of Rhopalocera to be found in a radius from Blackburn extending to Clitheroe on the one hand, to Bolton on another, and stopping short of Preston on a third, were enumerated. These were :—

E. cardamines L.
P. napi L.
P. rapæ L.
P. brassicæ L.
V. atalanta L.
V. antiopa L.
V. io L.
V. urticæ L.
V. polychloros L.
V. C.-album L.
V. cardui L.
Satyrus megæra L.
E. hyperanthus L.
E. janira L.
E. tithonus L.
C. pamphilus L.
L. phlæas L.
Z. quercus L.
P. icarus Rott.

In a few cases these were old records, and captures had not been made recently. Over-collecting and the placing of brick and tile and other works on favoured localities were responsible for a diminution even of the commoner species.

ITEMS OF INTEREST.

At the last meeting of the Mounting Section of the Manchester Microscopical Society, Mr. F. Dishley gave a demonstration showing methods of illuminating in order to display the characteristic features of diatoms. Mr. J. R. Wilson dissected an Atlas Moth, describing in detail the various external parts and internal organs, and he explained their functions. Particular interest was given to his remarks on the various prominent features of his exhibit, by Mr. Wilson displaying specimens of moths in which characteristics mentioned were shown to be well developed.

On November 17th an unusually profitable evening was spent by the Astronomical Section of the Preston Scientific Society. This consisted of the second of a series of practical demonstrations in various branches of physical science. Messrs. R. F. Hind and W. Taylor undertook the explanation and the performance of the experiments in the absence of Mr. G. J. Gibbs, who had arranged most of them. The primary object was to show the elementary arrangements and operations of various kinds of lenses, prisms, etc., embodied in the ordinary forms of optical insruments. The lenses were first dealt with, and beams of light were sent through them under a variety of conditions to show their uses and the effect they had in the changing conditions of divergent, parallel, or convergent beams of light. Experiments were also made with prisms, and especial interest was evinced in the working of the screens utilised to vary the colours of the spectrum.

A curious little instrument called the diplaidoscope was shown and explained by Mr. Hind. This instrument, invented fifty years ago, enabled transit observations of the sun and moon to be made with a fair degree of accuracy. It had been neglected for some years, but was again coming forward as being of considerable interest and use to amateur observers.

NOTES ON A REMARKABLE WATERWAY.

By "Nemo."

Idly passing away an hour before train time at the station of Garstang and Catterall, I was much interested in an old couple who had just alighted from the train that had come from Preston, and who were evidently revisiting the scenes of their youth after a long absence. A canal boat drawn by two horses was just passing below, and the old man exclaimed, "Eh, sithee, lass, a canal booat, an' wi' two hosses to't. Id's mooar nor forty year sin aw si' one afooar." It was the subsequent reminiscent vein induced by this little incident upon all my fellow-travellers that set my mind ruminating upon the varying fortunes of this, to me, most fascinating of waterways. I have tramped for miles along its banks, I have spent whole days with the rod at many of the basins, I have botanised along its lengths, and have dipped into its dank and dingy waters as well as the more pellucid in search of objects for the microscope.

When first this scheme was launched, those interested in it would possibly have rosy dreams for its future. There was no thought, then, of the great competition of the iron horse, and when the clumsy, rocking permanent way was first laid the country people were terrified at the noise made by oncoming trains, the sound of whose progress could be heard for miles. An old itinerary of Westmorland describes its course as nearly due north. "It begins at West Houghton, from thence to near Wigan, along the course of the Douglas river, by Chorley, Whittle, and, near the road from Wigan to Preston, intersects the Leeds and Liverpool Canal; from thence crosses the river Ribble to Preston; from whence by Spittal Moss it makes a bend to Salwick, by Barton to Garstang, where it crosses the river Wyer, and thence to Lancaster; then, running by the side of the town, it crosses the river Loyne above Skerton, to Hest, Bolton, Carnforth, by Capanway Hall, and passes Burton; from thence by Hang Bridge, through a tunnel, near Lever's Park, to Kendal. There is a collateral cut from Gale Moss, by Chorley, to near Duxbury; and another from near Borwick, by Warton, to Warton Crag. The feeder is one mile from the bason and Kendal, and is supplied by the river Mint. The total length of this canal is near seventy-six miles, with a rise of 222 feet and a fall of sixty-five feet. The collateral cuts together make five miles and a half in length, and are level."

It was possible at this time to cover 600 miles by waterway from Kendal, and indeed it was claimed that by the late inland navigation Kendal had communication with the Rivers Mersey,

Dee, Ribble, Ouse, Trent, Derwent, Severn, Humber, Thames, Avon, etc, in the counties of Lincoln, Nottingham, York, Lancaster, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c.

There is a cut from the dock at Glasson, at the mouth of the Lune, to communicate with the canal at Galgate. This has a direct connection with the sea, and is about two and a half miles long.

Three times the canal is crossed by the main road from Preston to just beyond Lancaster, these being near Brock Station, near Garstang, and at the top of Penny Street, Lancaster. It is never very far away from the great highroad, and is said to have 114 road and occupation bridges and two road aqueducts between Preston and Tewit Field, near Burton-in-Westmorland. The canal was opened between Preston and Tewit Field in 1797, and the length from Tewit Field to Kendal in 1819. From Preston to Lancaster is 30 miles, and from Lancaster to Kendal 27 miles. The former is the stretch with which we are more directly concerned.

Like many of the older buildings on the Quay itself at Lancaster, the old offices and wharves of the Canal Company, which lie near the Penny Street Bridge, are comparatively idle. They were the scene of much bustle and excitement at one time, when the old passenger packets and freight boats were so active. Passenger traffic was a feature of the canal, and at intervals along the route were installed buildings which found accommodation for relays of horses. These were smart animals, and in their excess of zeal often dragged the caretakers into the water through entanglement with the tow ropes. One of the men had repeated duckings. He laboured long in the service of the company, but met with an unfortunate end, being found dead under a hedge by the roadside.

The canal had a revenue in 1834 of £32,500, but with the advent of the railroad and its serious competition the packet service was discontinued in 1842, and in 1863 the canal was leased to the London and North-Western Railway Company for a fixed annual rent or dividend in perpetuity. This company has since then made the canal a famous one for lovers of coarse fishing. A fee of threepence entitle one to a whole week's sport, and the season ticket is offered at about half-a-crown. Special railway facilities are offered to ticket holders, and in the season there are large numbers of angling visitors from Wigan, Oldham, and many South Lancashire towns.

(To be continued.)

REFERENCE LIBRARY SALFORD PEEL PARK

Wayside Leaves.

At a meeting of the Preston Scientific Society held on Nov. 10th, the Astronomical Section dealt with the question of the references in Tennyson's works to astronomy. The references were read by Mr. Dilworth Abbott, of the Literary Section, who had looked them up, and explanations of the references were presented by the Chairman, Mr. G. J. Gibbs. Afterwards discussion took place on the chief points treated of in the poems, and the evening was both profitable and interesting.

Mr. G. J. Gibbs gave a lecture on "Local Astronomy" to the members of the Garstang Road Congregational Church Literary Society on November 14th, placing before the meeting pictures of most of the members of the solar system, also photographs of various portions of the starry skies, showing the directions in which astronomers were anxious to make progress, and pointing out how amateurs with very simple apparatus could assist the progress of knowledge.

Though there was a good gathering at Platt Fields, Rusholme, on Nov. 15th, on the invitation of the Manchester Astronomical Society, it was not possible to conduct the open-air demonstration, and brief addresses were given in the hall, which was not large enough to accommodate those who attended. Mr. W. T. Hesketh gave his summary of naked-eye astronomy and the mythology of the stars. Mr. William Porthouse dealt with the scenery of the moon, and Mr. James Bootherstone had something to say about the planet Saturn. Mr. William C. Jenkins explained two mechanical devices which he had designed—one to illustrate the apparent diurnal movement of the heavens, and the other the phenomena of an eclipse of the sun.

In a lecture delivered under the auspices of the Ogden Trust at Altrincham on Nov. 13th, on "English Homes and English Weather," Mr. Roger Oldham stated that just as nations could be identified by individual characteristics, so when we came nearer home could we differentiate between the various counties in our own little island. A Cheshire cottage, with its solemn-toned roof of stone flags or thatch, walls of black and white, and base of mossy sandstone, with the damson trees, the lush pastures, and the lowing kine, spoke of the art of Randolph Caldecott, and the very spirit of homely cheerfulness. Local examples were shown from Bowdon, Sale, and Poynton.

On November 10th, before a large audience in the Mechanics' Institution, Stalybridge, Mr. F. Whitaker delivered a lecture on photography, in connection with the Stalybridge Field Naturalists. The lecturer's experiences in pursuit of photos. were novel and amusing.

In a lecture delivered before the members of the Manchester Horticultural Improvement Society, Mr. O. Roberts placed the birds on the black list in the following order: House sparrow, bullfinch, blackbird, common thrush, several other species of the finch tribe, the great and blue tits, and the robin, the latter being a great enemy to the vines. Of those constituting the friends of the gardener were the swallow, martin, swift, hedge sparrow, common and golden crested wrens, pied wagtail, spotted flycatcher, missel thrush, fieldfare, willow wren, the cuckoo, also the nightjar and the barn owl.

The subject selected for the presidential address by Mr. George B. Harrison to the members of the Manchester Geological and Mining Society was in relation to colliery accidents caused by falls of earth. Out of a total of 37,666 lives lost in the 38 years since the Coal Mines Regulation Act came into force, no less than 18,161 were due to falls of ground. Dealing with the best means of preventing such accidents, which he admitted was not an easy matter (and the increasing depth of mines would increase the danger) Mr. Harrison said that the manager ought to see that his directions as to propping were understood by his men and carried out by them, and as sixty to seventy per cent. of the deaths through falls of earth occurred in the working places, those places should have the first attention. He attached great importance to systematic and correct propping. He did not wish to be regarded as thinking that either officials or workmen generally were negligent, but as one who had attempted to encourage colliery managers to make renewed efforts for further improvement.

Mr. F. H. Taylor, of Chorley, who gained the silver plaque for the best print in the exhibition at Nelson in connection with the Inter-Club Alliance, and who is an enthusiastic bee-keeper as well as bird lover, has been remarkably successful with this picture. It was hung at the Royal Photographic Society's Exhibition, being one of the much talked of judges' "200 only worth showing," and marked with blue label at the Northern Exhibition at the Walker Art Gallery.

Mr. Albert Jowett has been appointed junior assistant lecturer and demonstrator in geology at the Manchester University in place of Mr. W. C. Simmons, who has been appointed assistant geologist to the Geological Survey of England and Wales. Mr. Jowett, who was a student at the Yorkshire College, graduated with first-class honours in geology in the Victoria University in 1898, and afterwards acted as demonstrator in geology at Leeds.

At a recent meeting of the Mounting Section of the Manchester Microscopical Society, Mr. Abel P. Bradshaw showed some slides illustrative of the life-history of yeast. The process of growth by sub-division was shown under one microscope, and under another instrument was displayed a slide of yeast stained to show the nuclei and vacuoles in the granules. Mr. Bradshaw also showed how a piece of yeast, kept dry for many years, commenced to grow on being placed in a solution of sugar.

Mr. W. T. Hesketh has been delivering a series of lectures to various literary societies, the Radcliffe Literary being one of these. The subject has been "Naked Eye Astronomy," and the number of stars (about 36,000) to be seen in the northern hemisphere, and in the southern hemisphere (about 34,000) by the naked eye were set forth. Mr. Hesketh explained the position of the various groups of stars, went fully into the mythological stories connected with them, alluding to Biblical references.

The Rev. Henry A. Hudson, M.A., has read an interesting paper on "Christmas Lights at the Manchester Cathedral." Reviewing the lights used in the early Church for ceremonial purposes, he traced the history of decorative lights such as were used on festival occasions to emphasise religious joy. From the paper it was gathered that these lights were from earliest times placed upon chandeliers suspended from the roof and called "coronæ" or "phari." The "pharus" developed from Romanesque forms into the Gothic "candelabrum," sometimes called the "branch," and, later on, into the Renaissance chandelier familiarly known as the "spider." Evidence was given of the special illumination of the "branch" light in England at Christmas both before and after the Reformation, and the writer expressed an opinion that there was a presumption in favour of the Christmas lights of the Cathedral being a survival in unbroken continuity from pre-Reformation times.

NEW BOTANICAL LABORATORIES AT MANCHESTER UNIVERSITY.

November 3rd was noted by an event of unusual importance in Manchester botanical circles, when the new Botanical Laboratory in connection with the University was formally opened. Botanical work has long been a feature of work in the University, but for some considerable time the work has been hampered for want of accommodation, and it came as a welcome relief when by a gift of £1,000 from Mrs. C. J. Spence, of Cheadle, supplemented by other gifts, the authorities were emboldened to proceed with the present great extension, which has its frontage on Coupland Street. Invitations had been sent out to interested botanical friends, and there was a large gathering at the opening ceremony, which was performed by Dr. D. H. Scott, F.R.S. The company assembled in the Whitworth Hall, where the Vice-Chancellor (Sir Alfred Hopkinson), presided, and extended a hearty welcome to Dr. Scott. Supporting him were Sir Frank Forbes Adam, Sir Edward Donner, the Lord Mayor (Councillor Charles Behrens), Mr. E. J. Broadfield, Dean Welldon, the Bishop of Salford (Dr. Casartelli), Professor Weiss, Professor Lang, Mr. Paul Waterhouse (the architect of the new buildings), and others. From Whitworth Hall there was a procession to the new laboratories. Here Dr. Scott opened the principal door, a souvenir key being presented to him in commemoration of the event. Afterwards, in the Chemistry Theatre, he delivered an address, dealing mainly with the work of the late Professor Williamson, and concluding with some remarks as to the bearing of botanical studies on agriculture.

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Referring to the work of the late Mr. Lomas, before the Liverpool Geological Society, Sir T. Holland stated that he showed that the salt, crystallising out along the Runn of Cutch, had been transported some 500 miles in the form of minute particles, by the wind, and had been in due course deposited in the Rajputana region where it was now discovered.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Does any other town in Lancashire follow such a custom as is said to be observed in Lancaster on the election of a new Mayor, that of sending round a cake to each householder? Could any of your readers give me any information with regard to this custom?

J. Houghton.

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Lophozia bantriensis (Hook.) Dum. in South Lancashire (v.c. 59.).

Mr. W. G. Travis has sent me the above-named species for confirmation, which is correct. It is a good example of the type, and bears perianths which are somewhat rare.

Mr. Travis writes: "It was discovered in a curious manner. Towards the end of last month (September), I received some specimens of *Parnassia palustris* collected by Mr. C. R. Ritchings and Mr. F. C. Long in the Wolverden Valley, and among mosses about the roots of the plants I detected a stem or two of the Hepatic. At my request, Mr. Ritchings, accompanied by a Mr. Sutcliffe, visited the place again last week and were successful in finding the plant again."

It is the first record for South Lancashire for this rare species. I have only seen a few specimens which can be truly referred to the type: Dolgelly (Ralfs), Llanberis (W. H. P.), Teesdale (Spruce), South of Ireland (Hutchins).

Mr. Macvicar, in his "Distribution of Hepaticæ in Scotland," records a number of stations, but remarks that it is uncommon. *Lophozia Muelleri* (Nees), which I considered a variety of *Lophozia bantriensis*, but which is generally recognised as a distinct species, is much commoner, and all the specimens, so far as I remember, which I have seen from the Lake District under the name of *Lophozia bantriensis* have to be referred to that species.

W. H. Pearson.

November, 1911.

Sphenolobus exscetiformis (Breidler) Steph. **in Cheshire.**

My friend Mr. H. C. Broome, of Failsworth, a keen student of the Hepaticæ, has been fortunate enough in meeting with the above species at Alderley Edge, September, 1909.

It is a new record for the Manchester District and for Cheshire.

W. H. PEARSON.

November, 1911.

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A Record Confirmed.

Since the finding of *Cornus suecica* on the Darwen Moors, three members of the Darwen Naturalists' Society—Messrs. Dickson, Gibson, and Morton—together with another member employed on the moors by the Corporation, have carefully worked the portion available to them. The Dwarf Cornel itself appears to have fully maintained its position. Since the record was first made, one of the accompanying plants, *Trollius europæus*, has been discovered at the extreme end of Darwen on the north-west side, close to Rocky Brook, Tockholes. As this will come within the Brinscall radius, it will confirm a record which appears in the flora of the Brinscall Society. This is prefaced with an asterisk, and a footnote explains that it is doubtful if the plant will ever be found again.

W. H. WESTERN.

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A Remarkable Plaice.

The *Preston Guardian* of Nov. 25th states :—

There came into the possession of Mr. H. Melling, fish merchant, Market Street, yesterday, a plaice which is believed by those engaged in the trade to establish for its species a record in weight and size. Measuring 34in. in length and 23in. in width, it turns the scale at 21lb. The capture was made by the steam trawler Nile, belonging to Messrs. J. Marr and Sons, of Fleetwood, while fishing off the Faroe Islands. The previous record weight for a place is believed to be 12lb.

REFERENCE LIBRARY SALFORD. PEEL PARK.

Notes on the Butterflies of Cheshire.

In the "Manchester City News" a question was recently asked by "Sydney Ross": "Are butterflies less numerous than they used to be in Cheshire?" This has been answered by several correspondents. who appear to agree that they are less numerous. In my schoolboy days I was one of a company of collectors of butterflies and moths that included Thomas and Beckerton Blackburn, Martin Geldart, Stanley Leigh, and others, that carefully hunted much of the district within ten miles of Bowdon, and though for many years I have not had a collection, I have lived in this district of North Cheshire, and always take an interest in natural history, and can say that as far as my observations go there has been no decrease. All the butterflies mentioned I have seen during the past three or four years, with the exception of the Purple Emperor, which is said to have been captured. It was a tradition even in our days. This is one of the insects that might by a chance be taken anywhere in any summer. Certain butterflies like this and the Camberwell Beauty, which is not uncommon on the Continent, suddenly appear, not only in our southern counties, but also in northern districts, and then for a period of perhaps twenty years not one specimen will be recorded from any part of the country. A specimen of the Camberwell Beauty was captured in my time at Bowdon, and I had one in my collection which was taken near Gomersall, in Yorkshire. There was an opinion held by some in those days that these insects were wafted over from France on a stiff southern gale, but I well remember an old naturalist named Carter examining the specimen I was showing at the Field Naturalists' meeting one evening, saying, "That is an English one. It has a broader band edging the wing than the Continental specimen," and "the colour of the band is always much paler," he added.

The occurrence of the Painted Lady is quite as erratic, but its appearances are much more frequent. In some districts specimens may be seen almost any summer. That beautiful butterfly, *Colias edusa* (the Clouded Yellow) I have seen taken among the houses on Rose Hill, Bowdon. Very abundant on the Continent, and not uncommon in some southern counties, it is only at long intervals we see it here. There was a summer season, some fifteen years ago, when they seemed to be flitting about over every sunny meadow in these counties and North Wales, and I was told they were abundant in all parts of England. A notable species which is still found in the district is the Orange Tip. The Large Heath butterfly undoubtedly has disappeared owing to the cultivation of Carrington Moss. This insect was found on all our Lancashire and Cheshire mosses formerly. I well remember going to Carrington to replenish my specimens of that and various other Heath insects to find our old collecting spot, where keepers could be most easily evaded, covered with crops of clover on one side of the pathway, and acres of potatoes on the other. The Large Copper butterfly disappeared long before our time, but an old gentleman once showed me some specimens he took on Baguley Moor, but that was, of course, when it was a wild unenclosed heathery waste.

I am sorry to find from what my old friend, Mr. Cash, writes that butterflies are less numerous in the Delamere country; but if he now lived in this part of the county, which he once knew so well, he would find that the opportunity for the collector of Lepidoptera has greatly improved. It may interest readers to know that there are far more species of moths to be met with than formerly, even if one or two species have disappeared. The vast increase in building in the neighbourhood of Sale, Brooklands, Bowdon, and Hale, has led to acres of land being covered with trees, shrubs and plants of great variety, and as many of these have been brought from distant parts of this country and even from the Continent, the eggs and pupæ of new species of insects have probably been introduced in this way. In many parts of the country, about Hale and Ringway, there has been a great improvement in agriculture, and market gardening, flower and fruit growing, have added wonderfully to the extent and variety of the vegetation in this and other districts of North Cheshire. All of which means increased opportunity for insect life. The luxuriant mass of weeds and rubbish growing on the railway embankments between Altrincham and Chester, forming an excellent preserve for insect life of all sorts, has been created since Mr. Cash's early collecting days. Another little disturbed spot in which many species of birds find a shelter and nesting-place, and which has undoubtedly provided us with several new varieties of insects, is the long almost unbroken belt of plantation bordering the Brooks Estate roads from Prospect House in Hale to Brooklands, and on again from Wood Heys Park to Ashton-on-Mersey.

Portinscale, Hale, Altrincham. ALBERT NICHOLSON.

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At the meeting of the Microscopical Section of the Preston Scientific Society, on November 20th, Mr. J. Abbott gave a general explanation and description of "Diatoms." A beautiful series of slides illustrated the lecture, showing examples of Diatoms from various parts of the world. The many forms in which they existed were accurately described.

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The Darwen Naturalists held two successful meetings during the month. On Nov. 7th Mr. M. Ainsworth dealt with the question, "Is Mars Inhabited?" and on Nov. 21st Mr. F. Hollings lectured on "British Ferns: Their Classification."

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Mr. W. R. Duckworth on November 16th entertained the Radcliffe Literary Society with a lecture detailing a tour down the Mediterranean Sea, visiting Turkey, Palestine, and Egypt. The various features were excellently dealt with, and a fine series of slides lent interest to the proceedings.

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The Passing Hour.

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By the death of Mr. Thomas Altham, late of Bashall Hall, Lancashire loses a valuable ornithologist. A brief sketch of his career, with a portrait, appeared in our last volume. In his early days the student of bird life had not the advantage of the camera, and he had to rely upon accurate vision and faithful observation. If there was one thing more than another that betrayed itself in all Mr. Altham's work it was truthfulness. No matter how his opinions were tested they were always found to be thoroughly accurate. Born 73 years ago at Mytton, he was the son of a gamekeeper, and even though his business, that of a wheelwright, led him to reside at Burnley and Bootle, he ever preserved a deep-rooted love for the fair and open face of Nature. On going to reside at Bashall Hall, over thirty years ago, he was able to indulge in his love for the birds to the full. We have already gone over the brief outlines of a momentous career, but it may be mentioned that he rendered valuable service to Father Gerrard in compiling the Stonyhurst list of the birds and plants in the Ribble and Hodder Valleys. He took an especial delight in the fact that he was the first to discover the Chickweed Wintergreen in his district. In the rockery of his garden he preserved all the rare ferns of the neighbourhood.

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Ample testimony to his popularity was afforded by the presence of many well-known people in natural history circles. Among these were the Revs. Father Irwin, L. O'Hea, R. Mather, G. Wild, and R. Worsley, from Stonyhurst College; Messrs. T. and N. Garnett, Dr. Smithies, Mr. R. J. Howard (Blackburn), Mr. D. Bentley (Great Harwood), Mr. J. Widdup (Grindleton), Messrs. M. Demaine, T. Robinson, and R. Wrigley. There were floral tributes from many who were unable to be present.

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Some months before his death he had been compelled to leave Bashall Hall through failing health, and had resided with a son at Waddington. Here he lies with his parents beneath the simple green sward, as he himself would possibly most have desired. A movement is on foot, however, to erect a suitable memorial as a token of regard from the many naturalists and others who have been intimate with him or who have been from time to time welcome participants in the old man's never-failing store of knowledge.

At the meeting of the Manchester Literary and Philosophical Society on Dec. 13th, Prof. Weiss, the President, referred to the loss the scientific world had sustained in the death of Sir Joseph D. Hooker, who for nearly twenty years had been an honorary member of the Society. Born in 1817 at Haleswor h, Suffolk, he was the successor to his father, the late Sir William Jackson Hooker, Director of the Royal Gardens at Kew. He graduated M.D. at Glasgow in 1839, and was assistant-surgeon on Sir James Ross's Antarctic Expedition, from which voyage resulted his *Flora Antarctica*, *Flora Novæ Zelandiæ*, and the *Flora Tasmanica*. He was elected F.R.S. at thirty years of age, and was awarded the Royal Medal in 1854. President of the British Association at Norwich in 1868, he upheld Darwin's views. From 1872 to 1877 he acted as President of the Royal Society. In the latter year he was created K.C.S.I., being made a Grand Commander in 1897. He received the Order of Merit on attaining the age of ninety. Such are a few of the leading incidents in the life of a most remarkable botanist, endeared to the heart of many Lancashire workers by the sympathetic interest he took in their labours.

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A meeting of the Manchester Geological and Mining Society was held on Dec. 12th, at the Society's rooms in John Dalton Street, Mr. Geo. B. Harrison, the President, occupying the chair. Mr. P. Barrett Coulson (Manchester) introduced the question of the best methods of using exhaust steam from colliery engines. He advocated the use of the exhaust steam turbine. The discussion that followed showed very variable opinions, but the general idea seemed to be that the cost was too great, and that its success varied in different districts. Mr. Jos. Dickinson, the oldest member of the Society, was congratulated on attaining his 94th year. Mr. Dickinson on his part reminded the meeting that the Society had recently lost by death its hon. member, Mr. Jos. S. Martin, I.S.O. For many years he was an ordinary member, and for seven years had acted as hon. secretary. For his work in this direction and for his position he was made an honorary member of the Society. He had recently retired from the office of mine inspector on attaining the age of 65.

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The December meeting of the United Field Naturalists will be dealt with in our next issue.

Notes from Periodical Journals.

Zoologist, Nov. 15th, Fourth Series, Vol. xv., No. 179, pp. 429-432.

Three very interesting replies to Mr. F. Stubbs' article on the movement and behaviour of Redwings at night (*Zoologist*, Oct. 15th, 1911, Vol. xiv., pp. 361-366), from Messrs. Robert Warren, H. F. Booth, and F. D. Power. All three writers give interesting details of their own experiences, and confirm, or at least strengthen, Mr. Stubbs' conclusions.

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Zoologist, Nov. 15th, page 432.—A record of late Swallows. Two seen Nov. 2nd and 5 Nov. 5th. None were seen for some weeks previously. These observations were taken at Garstang, and are included in a note from R. H. Ramsbotham, Elmhurst, Garstang, Lancs.

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Zoologist, Nov. 14th, p. 432.—A short notice from the pen of Mr. O. V. Alpin, to the effect that he had had news of the breeding of the Long-tailed Duck (*H. glacialis*) in Orkney during the summer of this year. [This needs definite and strong proof before the record can be accepted. A few Long-tails remain each summer in Orkney waters, probably pricked birds unable to perform the spring migration north, but this does not justify anyone in assuming these birds breed there.—F.W.S.]

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British Birds, Dec. 1st, pp. 178-185.—An interesting article by Oliver G. Pike, F.R.P.S., F.Z.S.; on the nesting habits of those two rare British breeding birds, the Black-throated Diver (*Colymbus arcticus*) and the Grey Lag Goose (*Anser cinereus*), illustrated by most excellent photographs of the birds on their nests. Needless to say the exact island on which the nests were found is not stated, it being quite sufficient to state that they were found on *one* of the islands in the Outer Hebrides.

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British Birds, Dec. 1st, pp. 186-188.—"Notes on the Recovery of Marked Birds." Some very interesting returns are recorded. A brief notice of some may be of interest. A Linnet rung in May, 1911, in Warwickshire was recovered at Bordeaux, Gironde, France, on October 25th, 1911. A second Linnet rung in Berkshire on June 6th, 1911, was recovered at

Sabres, Landes, France, on October 25th, 1911. A Cormorant rung at Saltee Island, Co. Wexford, Ireland, on June 26th, 1910, was recovered at Audierne, Finistère, France, on Nov. 16th, 1911. A Woodcock rung near Carlisle, Cumberland, on May 15th, 1911, was recovered at Newtown, Co. Galway, Ireland, on October 31st, 1911. A Common Tern rung on Carn Skerries, Summer Isles, Ross-shire, N.B., on Aug. 5th, 1911, was recovered 15 miles south of Oporto, Portugal, in October, 1911, and a second Common Tern, rung at Loch Thom, Renfrewshire, N.B., on July 22nd, 1911, was recovered at Aveiro, Portugal, on October 11th. 1911. A Common Gull rung at Eil Beg, Dunstaffnage, Argyllshire, N.B., on June 29th, 1911, was recovered at St. Mullens, Co. Carlow, Ireland, on November 1st, 1911. A Starling rung at Viborg, Denmark, on October 7th, 1911, was recorded near Shropham, Norfolk, on November 12th, 1911, and a Black-headed Gull rung in Schleswig on June 25th, 1911, was recorded at Breydon, Norfolk, on October 27th, 1911.

[There is no denying the good which will, as time goes on, arise from this scientific marking of birds both in England, on the Continent, and in America to trace the movements of certain species in their migrations. In three years' work by the "British Bird Marking Scheme," nearly 20,000 rings have been placed on birds. Of this number Messrs. H.W. Robinson and F. W. Smalley (both North Lancashire ornithologists) have rung 5,756 birds, which gives an idea of the work and time these two have devoted to what they consider the best way of definitely ascertaining the movements of migratory birds. F.W.S.]

Dec. 4th, 1911. F. W. Smalley, F.Z.S., M.B.O.U.

In the *Naturalist* for December, the Rev. Hilderic Friend has an interesting *resumè* of the work done amongst the British Annelids during the past year. *Heterochalta costata* Clap. is recorded from Lytham. A number of species new to Britain are indicated, and about half-a-dozen species new to science are described. The majority of the latter were found in Kew Gardens, and they are probably of exotic origin.

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In the same Journal an interesting account of the boring habits of the Pholas is given by Mr. W. Harrison Hutton; and Mr. Hamshaw Thomas gives a brief summary of the results of recent researches into the Jurassic Flora by Prof. Nathorst, Dr. Halle, and himself. The paper was read at the Portsmouth meeting of the British Association.

The *Report of the Lichen Exchange Club* for 1911 contains a somewhat prolix review of Miss A. L. Smith's recent volume on "British Lichens" by the Secretary, Mr. Horwood. From the Report of the Distributor, Mr. J. A. Wheldon, we gather that 1,000 specimens were distributed amongst 30 members. New records of local interest may be instanced in *Pannaria rubiginosa* Del. var. *cæruleo-badia* Mudd, from ash trees, Rosthwaite, and and oak near Seatoller, Borrowdale, collected by Mr. Albert Wilson; *Lecidea coarctata* Nyl *var. argilliseda* (Schaer) on earth amongst Cladonia near Maghull, found by Messrs. Travis and J. A. Wheldon; *Buellia æthalea* Th. Fr., on a Silurian boulder, Warton Crag, sent by Mr. J.W. Hartley, who also sent from Silverdale *Opegrapha calcarea* Turn. *forma heteromorpha* A. L. Sm. Miss A. L. Smith determines a specimen of Mr. Hartley's from maritime rocks at Silverdale to be *Verrucaria maura* Wahl. *var. memnonia* Koerb. Cheshire examples of the new *Arthopyrenia areniseda* A. L. Sm., which have already been noted in this Journal, were distributed by Mr. J. A. Wheldon. The Club is engaged in the preparation of a Census Catalogue to show the distribution of British Lichens, and invites local lists for this purpose.

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Several new British hawk-weeds are described by the Rev. E. F. Linton in the December *Journal of Botany*, and Major A. H. Wolley-Dod's account of the British roses is brought to a conclusion. It is to be hoped after further study, that a considerable number of these may ultimately prove to be mere growth-forms, but it appears to be absolutely necessary that competent systematists should carefully study and name, by analytical methods, all the forms discovered before they can be grouped in specific types of more equal value.

Mr. B. Grove, M.A., contributes to the *Journal of Botany* for December some notes on several species of *Uromyces* (Leaf-fungi), viz., *U. flectens* Lagerheim on *Trifolium repens*, *U. Loti* Blyth on *Lotus corniculatus*, *U. ambiguus* on *Allium*, and *U. Lilii* Fckl. on *Lilium candidum*. Critical differences between these and allied species are clearly defined.

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An abstract of a paper on "Fungi found in polluted West Riding streams and other places" by J. W. H. Johnson, B.Sc., appears in this month's *Naturalist*.

"*British Fungi, with a chapter on Lichens*" is the title of a new book by George Massee. This should prove a serviceable work to students of mycology, for in addition to notes on distribution, life histories, collecting and preserving specimens, the diseases of plants caused by fungi, and other general information, there is a detailed classification of the Basidiomycetes. The notes on the genera and the concise descriptions of species are useful and practical, as also are the explanations of the terminology used by mycologists. The forty coloured plates by Miss Ivy Massee should be appreciated by students. The chapter on Lichens is an interesting survey for beginners, illustrated by two plates of drawings.

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A volume of *Transactions of the Rochdale Literary and Scientific Society* has just been published. Mr. William A. Parker, F.G.S., gives a description of "The Sandstones of the Rochdale District" with many interesting details. Referring to the well-known ridge of Blackstone Edge, he says, "The rock is a massive Fourth Grit; a section exposed here shows a fault with a downthrow to the south-west; the rock gives no indications of the presence of Calcium Carbonate, but yields abundant evidence of Oxide of Iron as a cementing material. The Grit consists of grains of very variable size, though mostly rather small. Quartz strongly preponderates. A considerable proportion of the grains are composite in character, probably fragments of Quartzite; many show well-marked uodulose extinction. Felspar is present in small amount, the crystals being remarkably fresh. Orthoclase, Plagioclase, and Microcline are represented. Muscovite Mica occurs in very small quantity.

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In the same volume of Transactions is an article by Mr. Walter Baldwin, F.G.S., on "Glacial Lakes near Rochdale." He points out that every glacier at the time of its maximum extension was bounded and limited by a terminal moraine, and that the large glaciers or ice-sheets have all helped (by damming up the drainage of the country) to form various temporary lakes which lay at or near the edge of the glaciers. These can be divided ints morainic lakes, morainic meres, and extra-morainic lakes according as their position was at the back of, inside, or outside the moraine. A beautifully prepared map is given showing the direction of the ice-sheet in relation to Rochdale, with the position of the lakes, viz., Lake Shuttleworth, Lake Naden, Lake Whitworth, and Lake Littleborough.

Mr. E. Leonard Gill, M.Sc., Curator of the Hancock Museum, Newcastle-upon-Tyne, has a very interesting article in the *Geological Magazine* for September. He figures and describes "A Carboniferous Arachnid from Lancashire." The specimen was obtained from the Coal Measures of Westhoughton, near Bolton. It belongs to the order Anthracomarti, family Brachypygidæ, and is referred by Mr. Gill to the genera Maiocercus. Mr. Gill says, "If I am justified in so doing the specimen not only necessitates a slight modification in the definition of the genus but adds largely to our knowledge of it. It is the dorsal side of Maiocercus that is shown, and up to the present only the ventral surface has been described." It is altogether a communication of considerable scientific interest and is well illustrated.

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In the same Magazine for October, Dr. L. Leigh Fermor, of the Geological Survey of India, deals with the vexed question, "What is Laterite?" To geologists and mineralogists this communication is very helpful, as so many opinions have been ventured on the nature and origin of this material. Dr. Fermor deduces that "True Laterite is a hydrated mixture of Oxides of Aluminium, Iron, and Titanium of extremely variable composition, and showing every gradation from ferruginous Laterite almost free from Alumina and Aluminous Laterite almost free from Iron. When pure enough to be used as Aluminium ores the Laterite is usually known as Bauxite." The writer refers to the work done by Sir Thomas Holland, of the Manchester University, in the analyses of Laterite.

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In the recently issued *Journal of the Palæontographical Society*, Vol. LXIV., there is a new species of Scorpion from the Middle Coal Measures of Sparth, near Rochdale, figured and described by Mr. R. I. Pocock, F.R.S., Superintendent of the Zoological Gardens, London. The specimen is named *Eobuthus holti*, and is very interesting. The posterior borders of the first three sterna are markedly laminate and bi-lobed; the lobes are semi-circular, and considerably overlap the anterior portion of the sterna behind them; the last sternal plate has no laminate lobes and is exactly like that of recent Scorpions. The interest of these laminate lobes on the sterna lies in the fact that they have

a general resemblance to the gill-bearing appendages of the same segments in Limulus. In possessing these lobate sternal plates the Scorpion now described is more like Limulus than is the Silurian Scorpion Palæophonus, and it supplies one more valuable link in the chain of evidence pointing to affinity between the Scorpions and the Xiphosuræ.

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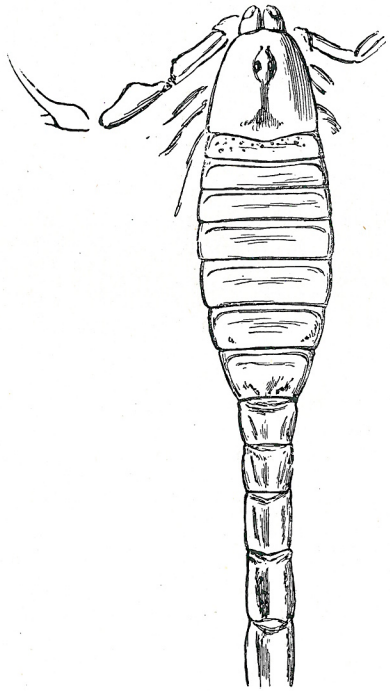
In the same Journal Mr. Pocock describes a second Scorpion from Sparth, new to science, and named *Anthracoscorpio buthiformis*. The specimen is in a good state of preservation, and shows the dorsal side very clearly. Only fragments of the legs are preserved, but the details of the chelæ of the left side can be deciphered. The fossil is in the British Museum, and is registered as the type specimen of the genus.



Anthracoscorpio buthiformis sp. Nov., four times nat. size.
Coal Measures, Sparth, Rochdale.

W. A. Parker Collection.

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Yours sincerely

A. L. Cortie. S.J.

Work and Workers.

FATHER A. L. CORTIE, S.J., F.R.A.S.

Father A. L. Cortie, S.J., F.R.A.S., was born in London in 1859, and received his education at Stonyhurst College. In 1878 he entered the Society of Jesus, and after a course of philosophical and theological studies, with an interim of four years' mastership in the department of physics and mathematics at Stonyhurst, was ordained priest in 1892. He early demonstrated a love for astronomical studies, and since 1881 he has been attached to the Stonyhurst Observatory, first under the distinguished and popular astronomer, the late Father Perry, who was also his mathematical master while he was a boy at Stonyhurst, and subsequently under the present director of the observatory, Father Sidgreaves. At the present time he is professor of physics at the College, and also director of music, in addition to his duties at the Observatory. He was elected a Fellow of the Royal Astronomical Society in 1891, and has served for several years on the Council. He is also a member of the British Astronomical Association, and for ten years was the Director of the Solar Section of the Association.

In spite of the heavy public duties which his prominence in astronomical circles has brought in its train, he still finds time to associate himself with many Societies of the county, and his position is one unique in this respect. During the present season he is President of the Manchester Astronomical Society, Vice-President of the Liverpool Astronomical Society, President of the Preston Scientific Society; he is Honorary Member of the Southport Scientific Society, and Honorary Member of the Astronomical Society of Wales. In 1905 he directed an expedition to observe the total eclipse of the sun, Aug. 30th, to Vinaroz in the South of Spain, and in 1911 he was appointed chief of the British Government Eclipse Expedition to the Tonga Islands, South Pacific. He has attended as a delegate

of the Royal Astronomical Society the successive triennial meetings of the International Union for Co-operation in Solar Research at Oxford, Paris, and Mount Wilson, California, and is a member of its committee for the observation of the spectra of sun-spots. He has written extensively, and is the author of some fifty memoirs and papers on solar and stellar physics, spectroscopy. and terrestrial magnetism, mostly in the Memoirs and Monthly Notices R.A.S., the Astrophysical Journal, the Memoirs and Journal B.A.A., and the Reports of the British Association. He was one of the leaders on the occasion of the British Association's visit to Stonyhurst in 1903. He has lectured on astronomical subjects in most of the chief towns of England, and has a lengthy list of engagements in the County Palatine itself this season. He is a member of the Salford Diocesan Commission on Church Music.

The present season has witnessed a remarkable revival in the study of astronomy in the County Palatine. Many workers are playing a prominent part in the popularising of the science. At the same time a great deal of this increased activity is due to Father Cortie's personal influence. This year may be fitly described as his year. Though he has year by year been increasing his popularity, and gradually filling the position in the popular estimation once held by the late Father Perry, at no period of his career has he stood so high in popular favour as he does at the present moment. In one of those spontaneous bursts of public appreciation as sudden as they are irresistible, there is a universal call for his services, and a ready recognition of the value of his untiring labours in behalf of science.

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THE OBSERVATORY AT STONYHURST.

A few particulars in respect of Stonyhurst Observatory itself may not be considered out of place here. The Observatory dates its first beginnings from 1838-9. The most conspicuous portion of the Observatory buildings consists of a hexagonal centre-piece, with projecting chambers abutting on three of

its sides. The cylindrical chamber which forms the upper storey, and which is now only used to contain the anemometer, was originally the equatorial room, and was furnished with a four-inch achromatic telescope, which was mounted in 1845. In the same year the series of meteorological observations was begun which has been continued ever since.

Stonyhurst was visited by General Sir Edward Sabine in 1856, and acting on advice then tendered a series of magnetic observations were commenced, and instruments procured for the absolute measurement of the elements of terrestrial magnetism. In 1865, Father Sidgreaves issued the first Magnetic Report, which was presented to the Royal Society by General Sabine, who at the same time asked for a grant to enable continuous records to be made. The donation of the present set of photographic instruments was the result. About the same time the Board of Trade chose Stonyhurst to be one of its northern meteorological stations and presented the self-recording instruments required for the purpose, and at the same time gave a handsome yearly allowance, which was continued until 1883, when the number of stations was reduced to three. Since that time the College has borne the expense of the Observatory work that has been carried on.

In order to bring the astronomical department to the level of the meteorological, the College bought, in 1865, a new and more effective equatorial telescope of eight-inch aperture ; and a new room, with a revolving dome, which lies to the south-west, was built to receive it. From this time the old Observatory has been devoted entirely to meteorological work, an underground chamber for magnetic observations having been added in 1866. In 1893, a new 15-inch object glass, made by Sir Howard Grubb, of Dublin, was substituted for the old eight-inch glass in the great equatorial telescope. This glass was presented by the admirers of Father Perry, who for many years presided over this department, the necessary

funds being in great measure the result of a meeting held at Stonyhurst in 1890, under the presidency of Sir Edward Watkin, M.P.

The Observatory was from 1868 to 1889 under the charge of Father Perry, and during this period he made magnetic surveys of Western and Eastern France, and of Belgium. He was sent to Cadiz on public service in 1870, to observe the total eclipse of the sun; in 1874, in company with Father Walter Sidgreaves, he was sent in charge of the British expedition to Kerguelen Island to observe the transit of Venus, In 1886 he was in charge of an eclipse expedition to Carriacou, in the West Indies; in 1887 to Pogost, on the Volga. In 1889 he visited the West Indies again on an eclipse expedition, and accomplished his object, but died there of pestilence contracted in the station selected, the Isle du Salut.

Under his direction the chief work of the Observatory was chiefly diverted to the study of solar spots and faculæ, daily observations being made of the chromosphere and careful drawings of the spots, in order to determine their shape and size, and the rate of their passage across the disc. The solar spectrum was also carefully observed. On Father Perry's death, Father Sidgreaves again took up the work, continuing the observations on the sun, and devoting himself in addition to stellar spectroscopy, a department of the work contemplated, but not begun by Father Perry. A seismographical department was added in 1908.

The photo. of Fr. Cortie is by Lafayette.

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On December 6th the members of the Darwen Society had a visit from the Rev. J. R. Rendell, of Accrington, who lectured on the "Visible, Chemical, and Thermal Rays of the Sun's Spectrum, and their influence on Plant Life." The lecture was a splendid one, but the influence on plant life was only briefly touched upon.

THE PLANET MARS.

On Wednesday, December 6th, the members of the Manchester Astronomical Society met at the School of Technology at Manchester, when Mr. W. Porthouse read a paper on Mars, illustrating the subject with a series of slides made from photographs of the planet. As is usual on all occasions when this planet is the subject of discussion, the chief topic was as to the possibility of its being inhabited. Mr. Porthouse said that many theories had been propounded in useless endeavour to prove that Mars could not be the abode of life, but in no single instance had it been shown to his satisfaction that we were justified in dogmatically asserting that this planet was not inhabited. The arguments against life existing there were founded on atmospherical rarefaction and non-humidity, shortage of heat and light, and absence of water. To his mind the fact that the conditions on Mars differed from those on our globe did not warrant us in suggesting the absence of life of any description. If there were different physical conditions, why should there not be different types of life to meet them, and different modes of living? Even on our earth we had degrees of life differing so much that one species could not exist under conditions to which another was accustomed. Our outlook here was limited to a few sub-types of one general type of life, but why should we be required to believe that ours was the only type of life in existence? Mr. Porthouse referred to the millions of glorious coloured suns, and the vast number of solar systems, and asked if it was consistent to believe, among the myriad host of planets, many of them infinitely larger than our earth, that our earth was the sole habitation of civilised and organised life? The very fact of our presence here seemed to be evidence of life on other globes in space suited to the conditions which obtained there.

While Mr. Portinscale's view was upheld by certain of the members, the Rev. Fr. Cortie, the President, said that science required a thing to be proved before acceptance. On this question we could only say that we did not know. We might believe, but we could not tell.

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On December 5th, before a large attendance of members of the Manchester School of Technology Textile Society, Mr. J. H. Watson had on exhibition his fine collection of eggs, larvæ, pupæ, and imagines of silk moths, with samples of their silk. This was to illustrate a lecture he gave on "The Wild Silk Moths of the World." He dealt with the antiquity of the silk weaving industry, and showed how and why silk was produced. In passing on to speak of the Saturnidæ, he described the common mulberry silkworm as a degenerate insect. Silk cocoons were shown, with the method of emergence of the moths, and a brief review of the more valuable Saturnidæ was given. Mr. Watson also dealt with the effects of various experiments in hybridisation. The lecture was further illustrated by a series of lantern slides.

MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY.

Further Notes on the Common and Lesser Shrew.

The bulk of the evening on the occasion of the meeting of the Manchester Literary and Philosophical Society on December 12th was taken up by Mr. T. A. Coward, who in the first place communicated a paper by Mr. L. E. Adams on "The Duration of Life of the Common and Lesser Shrew, with some Notes on their Habits." In this it was shown from Mr. Adams' recent observations on the moults and habits of the shrews, that they confirmed his previous theory that all adult shrews die in their second autumn. He found that all individuals examined during and shortly after December were sexually immature; that the genitalia are not atrophied as winter approaches; that adult shrews do not moult into winter pelage; and that the measurements of a large number of shrews show that a maximum size is reached in summer. Observations of a captive shrew showed the limited power of sight, the method of burrowing, the nature of the food accepted or rejected, and the enormous appetite.

The Little Owl.

Mr. T. A. Coward read a paper entitled "A Note on the Little Owl, *Carine noctua* (Scopoli) and its Food." Mr. Coward holds that the earlier records of this bird in Britain are founded on very doubtful evidence, and do not at all justify its inclusion in the British list as an occasional wanderer from the Continent. The bird is charged with being destructive to game. The examination of regurgitated pellets does not throw light on this assertion, but provides interesting information about its food. He referred to the food of the Southern Little Owl, *Carine glaux*, mentioning the discovery of a portion of a Galeodes in its pellets. He suggested that the inorganic matter in the pellets might be due to the habit of the bird of eating earthworms.

Interesting Fungi.

Mr. T. G. B. Osborn exhibited specimens of *Bulgaria polymorpha* Oeder, which had been found near Altrincham, and he also showed a series of photographs of the fungus *Coprinus comatus*, illustrating the mode of the shedding of spores, and pointing out that the gradual disappearance of the velum is simply to allow the spores to fall freely to the ground.

SOME NOTES ON THE HYDROZOA AND POLYZOA.

By Joseph Smith, M.R.I.A.,
Fellow of the Royal Society of Antiquaries, Ireland.

(Continued from page 257.)

There cannot, therefore, exist any doubt as to the power of the organism of secreting a fluid in the cavity by means of certain endodermic cells, and the general conclusions which have been arrived at, by those who have given attention to these features peculiar to some of the Hydroida and to numbers of the Polyzoa, are, that "two kinds of endoderm cells occur, namely, secreting gland cells, and vacuolated cells for the absorption and storage of digestive products in the fluid form, and that in some Hydroids, but apparently not in the Hydra, the intracellular digestion of portion of the food may occur." Yet further investigation must be followed out, before it can be satisfactorily demonstrated what is the true and full method of digestion followed out by members of the Cœlenterata. There does not appear, however, any semblance of a doubt that a species of alkaline fluid is secreted in the cavity of the Cœlenterata, which *"is capable of emulsifying fats and converting proteids into peptones, that a process of intracellular digestion also occurs, which is accompanied by an acid secretion, and that in that process proteids are converted into peptones, fats saponified, and starch granules dissolved. But there is some doubt as to the form in which the soluble products of digestion are taken up by the endoderm, and stored for further use and distribution through the organism."

Numerous experiments have been made with the view of substantiating the manner in which this process of obtaining nutrition is carried out; but no information has been gathered, which opens the way to a satisfactory solution of this wonderful feature of animal economy, the more so, since the cavity of the Hydroid body being simple and continuous, the different regions may be recognised possessing the predominant varieties of endoderm cells, yet "no special digestive organs of definite shape can be recognised on simple dissection and examination with a lens."

The simple sponge form, Ascetta, presents a good resemblance to the Hydra, and might be said from appearance to belong to the same group. Like it, it is a hollow sac-like organism, one end of which is attached to some object, the

* "Science Progress," 1895, p. 454, "On Digestion in the Cœlenterata." Sydney J. Hickson.

upper or facet being a vent, or vasculum. The central cavity is perigastric. The cells of the endoderm, however, resemble the choanoflagellate ; each of the cells, besides having a nucleus, has one or more contracting vacuoles, which are supposed to secrete water, urea, and carbonic acid gas. Did the Ascetta possess a set of cilia or tentacles, and no pores, it would have all the appearances of a hydrozoon, but unlike this organism, it possesses a mesoderm—or inner layer—is devoid of nematocysts, while the choanoflagellate features belong to the Infusoria and not to the Cœlenteratæ. Hence, notwithstanding this great resemblance, a large span separates the Porifera from the Hydrozoa.

The vacuolation of the cells of the Hydra is answerable for the granular appearance which is observed when examining the animal under the microscope, and it has also been the means of adding to our information on the structure of the Hydra. In the Viridis, green Hydra, the cells of the endoderm are prominent from the presence of green granules or colouring matter, and which have been ascertained by means of the spectrum* to be chlorophyll, the colouring matter found in vegetable productions. The view put forward by Pennington† is, that "chlorophyll has until recently been considered an exclusive vegetable product," and many observers hold "that the green colouring matter is caused by minute Algæ, which have penetrated into the substance of the Hydra." This view, however, does not accord with the results obtained by the majority of those who have investigated the subject, and we may conclude "that chlorophyll is present in the protoplasm of *Hydra viridis* as an animal and not a vegetable product." This strange feature imparts the characteristic colour giving it the specific name, and examined, the green will be found to be similar not to that bright green which increases the brilliancy of birds, but to that found in grass and trees, and the conclusions arrived at are correct so far as to the presence of chlorophyll. There is no reason against the possession by animals of this colour, which is of such great utility to the vegetable world, enabling them to absorb the carbon contained in the air. In the case of the Hydra the colour is not present as would seemingly be suggested as an animal chlorophyll, but it is due to the symbiosis of a small green Algæ, in the form of round green corpuscles. These were formerly regarded as being equivalent to the chlorophyll corpuscles of the vegetable world, but it is now

* Semper, "Animals." p. 83.

† "Natural History of Zoophytes."

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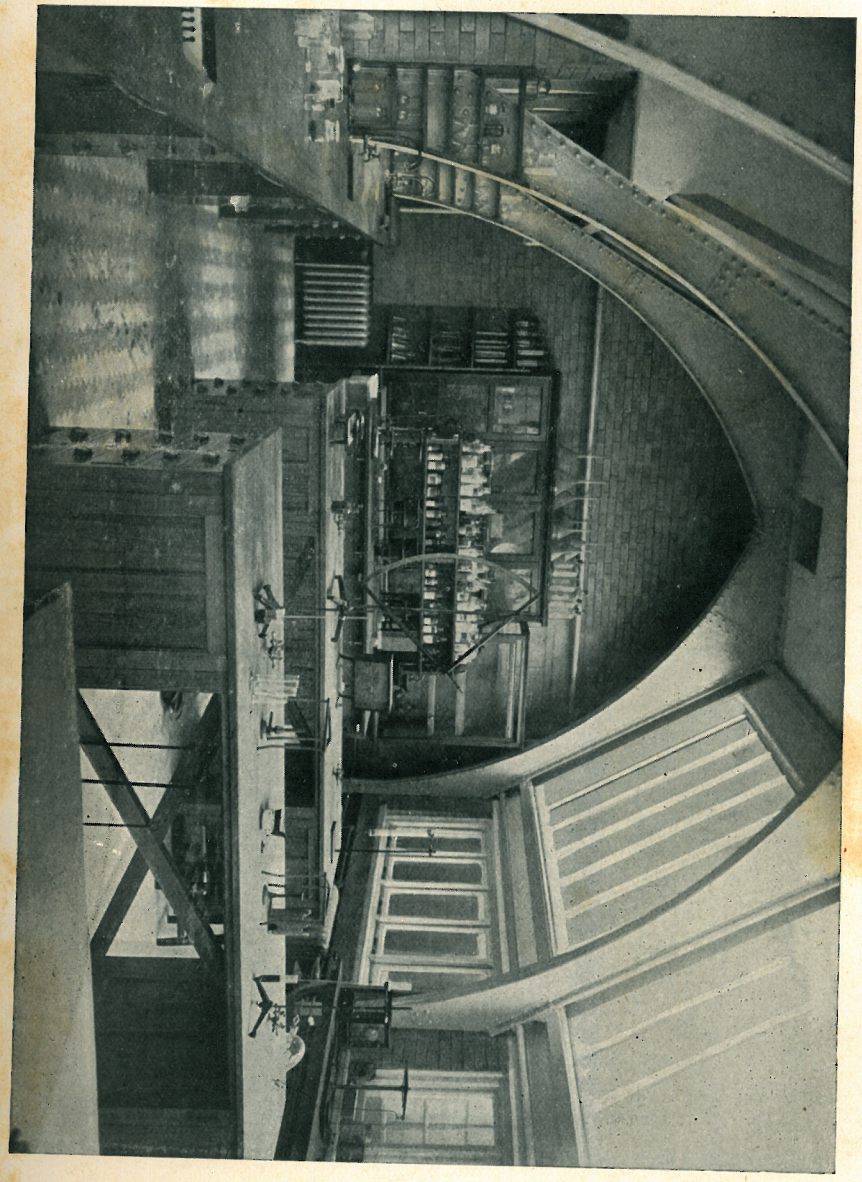
NEW BOTANICAL LABORATORIES, COUPLAND STREET.



LABORATORY FOR PLANT PHYSIOLOGY, THIRD FLOOR.

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ascertained that these granules are surrounded by a cell wall. Beyerinck, who gave great attention to these forms, has, after encountering many difficulties, been successful in cultivating them, and finally to cultivate them independently, proving the fact that they are small green Algæ, and to which he has given the name *Zoochlorella*, living within the cells of the Hydra. The advantage derived by the polype from the presence of these is that the Algæ are able to form starch and sugar from the carbonic acid in the water, and which would transfuse through the cell wall of the animal into the animal body. The development of the Hydra, as in all the Hydroida and Polyzoa, and indeed in all animal and vegetable formations save the protozoon, is by means of cells. Now the Hydroida and Polyzoa are Metazoa, animals constituted of an aggregation of cells arranged in a differentiated form, some of which are external, being exposed to the influence of stimulating principles, others internal, and so removed from those influences which play upon and affect the external cells. A protozoon as opposed to a metazoon consists of one cell, and so remains throughout its sphere of life. The theory that the bodies of animals as well as all vegetable structures were built up of single cells was not seriously considered until recently, although as far back as 1839 the matter was apparently the subject of discussion, for Schleiden about the time enunciated the cell theory as relating to the structure of plants, and which was extended to animal bodies shortly after by Schwann. Still the main outlines which recent investigations have brought to a crisis existed in an incomplete and unformal condition, and, says Marshall,*" were rather hinted at than clearly expressed in the writings of Robert Brown, Dutrochet, Van Mohl, and others." To Schwann, however, must be awarded the place of honour in the application of the cell theory to animal tissues ; he pointed out that it was by changes taking place in these cells, and the evolution thereby brought about, that animal tissues were formed, and further that the "differences in the different properties of the different tissues and organs of plants and animals, depend on differences in the chemical and physical activities of the constituent cells." The idea held by Schwann was that these cells might arise *independently* in a surrounding matrix or blastema, but Goodsir in 1845 defined the doctrine that cells could not originate without the presence of pre-existing cells, and from which they arise by fission, an advance in animal morphology which found very able supporters in Reinak,

* President's Address, Manchester Microscopical Society, Feb. 6th, 1890, p. 2.

Kolliker, and Virchow, and which was a doctrine very soon universally accepted. This heralded Von Baer's discovery of the mammalian egg, or ovum, and his demonstration that it consisted of a nucleated cell, burst on the scientific world as a novelty, and so increased histological investigation as to completely establish in a very short time the cell theory. The fact once demonstrated, the theory was applied to all branches of the Animal Kingdom with equal success, and it resulted in opening out what had previous to this discovery been apparently overlooked, that all life, even that in the lowest forms, had originated from this egg cell. It was now clearly understood, that from this single cell other cells originated by division, which by repeated fission or division became compound cells, eventually building all parts and tissues from which not only the mammalian adult, but the invertebrate animal body was derived ; thereby illustrating in a new light the truth of the speculation made by Harvey many years before that, *omne vivum ex ovo.* The definition of this theory is perhaps, says Marshall, one of the grandest generalisations and soundest established in morphology, and the division of the Animal Kingdom into the Protozoa and Metazoa, *i.e.*, animals formed of a single cell, which retains this form throughout life, and those which began life from a single cell or ovum, finally becoming multicellular, can only rank as the most fundamental and most "*natural divisions of all zoological distinctions*,"* protoplasm in the meantime, the basis from which the cell builds itself up, playing a very important part throughout the development.

In following out the development of the Hydroid and Polyzoan zoophytes, the same law takes effect as with the higher animals, every member of each order having originated from an egg or cell, which is propagated by a variety of methods throughout the various families belonging to both orders. The harmony of the arrangement and the economy of reproduction offer very interesting problems for investigation. In the *Eudendrium confertum*, *Dicoryne stricta* of Allman, amongst the

* Protoplasm is now considered to be a recticular mass, the minute meshes of which are formed by delicate bars or trabeculæ, and uot as possessing a homogenous matrix nor built up of fabrillæ or vesicles. These trabeculæ consist of a colourless hyaloplasm, within which are embedded the darker granules or microsomata. These meshes, however, form only a sponge-like frame, the interstices being filled with a liquid or viscid sap and chynema . . by traction, or tension in any one direction the network will assume a fibrillar appearance and the trabeculæ become more or less parallel.

Hydroids, the gonophores are carried on blastostyles, or immature polypites, and produce free gonozooids which are oval, pointed at one end, expanded at the other, ciliated all over, and bear two tentacles at the broad end. This form is considered by Hincks to be intermediate between the fixed gonozooid and the medusoid form, the tentacles representing the usual swimming organs, and their ciliary action replacing the pulsation of the swimming bell. In the *Tubulariidæ*, three forms of distribution are favoured. There is reproduction by fixed sporosacs, which is noticed in the genus *Tubularia* Linn.; the *Ectopleura* (Agassiz) family favours propagation by means of the medusiform gonozooids, and possesses a polipary—Hybœocoridæ ; while the third method of reproduction is in the shape of medusiform gonozooids without the polipary, the *Corymorpha* possessing sessile and the *Halatrachus* pedicillate gonophores. Amongst the Polyzoa, reproduction is generally assumed under two forms, sexual for the development of the individual membership, and asexual for the increase of the colony, the buds in the asexual process being developed from the endosarc or funiculus, which consists of elongated cells pointed at both ends and resembling in shape the frustrules of Navicula. It extends some distance along the wall of the stomach, and gives off processes which reach to the side of the zœcium, and extending through the base thereof so forms a connection between the zœcia and the colony. A feature of reproduction peculiar to the freshwater families is by means of "statoblasts," or "winter eggs," which are spherical bodies "covered with network and armed with spines." They are not considered as ova, but are by some naturalists regarded as reserves of *generative force* for the purpose of supporting the colony in case of injury ; they offer a very interesting sphere for investigation, as it is uucertain whether their true connection with the colony—beyond being the means of generating and providing fresh additions to the community—has been worked out. Throughout the whole of the families of the Hydroida and Polyzoa new features of interest present themselves to the microscopist, absorbing questions have to be cleared up, and many life histories have to be worked out, while no dearth of material to work on exists. These organisms are found in plant-like tufts of many cells united together, "sometimes they spread over shell and stone like the finest lacework or fairy chains, sometimes they rise into stony corals, or broad and flexible fronds, at times they bury the seaweed beneath their fleshy crusts, or invest it with a silvery network, while in others the colonies are built up of excellent little tubes gracefully curved and delicately tinted, forming the most varied and attractive combinations."

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 253.)

18 { Pileus greyish or greenish-yellow ; stem yellowish, 5-9cm. long - - - *M. epiterygia* Fr.
Grey or brownish ; gills fold-like ; stem livid 3-4cm. long, *M. pelliculosa* Fr.

19 { *Plicato-crenate*, 1cm., *subumbonate*, yellowish ; stem reddish, yellowish inside - *M. plicatocrenata*
Becoming depressed ; not plicate ; stem *whitish*- - 20

20 { Pale ochre, 1cm., sulcate ; stem *glutinous* *M. rorida* Fr.
Yellowish, 1-2cm., striate, stem viscid - *M. clavicularis*

21 { Stem with a dilated base, bulb or disc - - - 22
Without this character - - - - - - 26

22 { Pileus white, 2-3mm. - - - - - - 23
1-2mm., orange, mid. rose, gills same *M pterigena* Fr.

23 { Gills adnate, or arcuate ; stem 2-4mm. long - - 24
Gills free ; stem 2-4cm. long - - - - - 25

24 { Convex, gills with shining particles *M. saccharifera* B.
Conical, white-mealy - - - *M. discopoda* Lev.

25 { Campanulate, minutely hairy ; disc striate, large, orbicular - - - - -*M. stylobates* Fr.
Convex, scurfy ; disc minute - - *M. tenerrima* Berk.

26 { Colour *clear and bright*, not fuscous nor ashy. Usually single, terrestrial. Pileus 2 to 6cm. - 27
Stem *firm*, *tough*, somewhat strigosely rooting. Persistent, usually cæspitose *on stumps* - 37
Stem *long*, *slender*, *flaccid*, tough, rooting. Solitary amongst grass. Not hygrophanous - - 56
Stem *fragile*, scarcely rooting. Often strong smelling, *hygrophanous*. Solitary terrestrial, or cæspitose on wood - - - - - - - - 43
Stem *slender*, *abruptly attached*. *Minute* and delicate. Gills adnate or uncinate - - - - - 62

27 { Yellowish, powdered white, crenulate, 2cm. *M. farrea* Fr.
Not shining white-pulverulent - - - - - - 28

28 { Odour radishy ; gills connected by veins - - 29
Without smell of radishes- - - - - - - 30

29 { 2cm., rose-purplish ; stem yellow ; tufted - *M. flavipes* Q.
3-6cm., lilac, rose, or pallid ; stem paler - *M. pura* Fr.

30 { Pileus rosy or becoming pale - - - - - - 31
Pileus yellowish, or white- - - - - - - 33

31 { Striate, 2cm.; stem squamulose, rufescent *M. zephira* Fr.
Obscurely striate, stem glabrous, pinkish white - 32

32 { 2cm., obtuse, gills adnate, whitish - *M. pseudopura* Cke.
4cm., conical, gills uncinato-adnexed, pinkish *M. Adonis*

33 { Cæspitose. White, 2cm., striate, conico-campan. *M. gypsea*
Scattered. Pale yellowish (34) ; white (36).

34 { Gills *soon free*, distant. Pileus *even*, cracking 1-5cm. Stem *white*, short - - - *M. flavoalba* Fr.
Gills adnate ; P. *finely striate*, 1-2cm.; stem *yellowish* 35

35 { Obtusely campan.; gills linear ; base downy *M. lineata* Fr.
Acutely campan ; gills broad, uncinate *M. luteoalba* Fr.

36 { Gills soon *free*, distant ; P. 1-5cm., *even* *M. flavoalba* Fr.
Gills *adnate*, *crowded* ; P. 1cm., *sub*striate to even, becoming expanded ; stem *glabrous* - - *M. lactea* Fr.
Gills uncinate, distant. P. 1-2cm., *sulcate*, diaphanous, not expanding ; stem *pruinose* - *M. nivea* Q.

37 { P. *viscid*, striate, white or brownish, 3cm. *M. sudora* Fr.
Viscid when moist, even, yellow-brownish, bluish or whitish, 3cm.; stem short *M. tintinabulum* Fr.
Striate or rugose, the margin at least ; not viscid - 38

38 { Grey-brown, 3-7cm.; *stem deeply striate*..*M. polygramma* Fr.
Stem striate, but not deeply so ; rooting - - - 39
Stem even - - - - - - - - - 40

39 { Pale umber, 2cm., *cæspitose* ; gills adnexed *M. prolifera*
Dull brown, 3-7cm ; gills adnate, toothed *M. Berkeleyi* M.

40 { Smell strong. Hemispherical, 6*mm.*, brown, sprinkled with particles. Stem pulverulent. *M. psammicola*
Campanulate, 2-5cm.; not pulverulent; stem glabrous 41

41 { Brownish ; gills *adnate with a tooth*, connected by veins, *soon pinkish* - - *M. galericulata* Fr.
Gills whitish or greyish, not becoming pink - - 42

42 { *Oval*, slate, disc umber ; gills ascending *M. parabolica*
Brownish ; gills adnexed, *cut out behind* - *M. excisa* Fr.
Grey-brown, *rugulose* ; gills arcuato-adnate *M. rugosa* Fr.

43 { 3*mm.*, conical, pale ochre ; rooting ; scented. *M. paupercula* B.
5*mm.*, hemispherical, brown, *pulverulent*. *M. psammicola* B.
Larger, pileus 1-3*cm.* diam. - - - - - - 44

44 { Slaty-black, *margin whitish* ; gills soon glaucous. Stem-base swollen, hairy. - *M. atroalba*
Plane, *disc broad*, blackish-brown to grey *M. peltata* Fr.
Without these characters - - - - - - 45

45 { Pileus sulcate, plicate or striate - - - - 46
Pileus striate when moist, even when dry - - - 52

46 { Pileus blackish-indigo (47*a*) ; dark umber, disc blackish (47*b*)
White, 1cm., crenulate ; *very delicate*, tufted *M. tenuis* Fr.
Pileus grey, greyish-brown, or brown - - - 48

47 { *a* Dries black ; gills white ; in fir woods - *M. atrocyanea*
b Gills white ; odour slightly nitrous - *M. pullata* B. & C.

48 { Ashy-brown, smell rancid. The stem easily splits, the pieces recurving - - *M. dissiliens* Fr.
Without these characters - - - - - - - 49

49 { *Entirely grey*, pruinose Odour of *nitre*. *M. leptocephala*
Odourless ; umber, mid. darker (50*a*) ; brownish-ochre (50*b*)
Pale tan, mid sienna, edge grey (51*a*); grey, mid. umber (51*b*)

50 { *a* *Sub*umbonate, finely striate ; G. not veined *M. vitrea* Fr.
b *Umbonate*, sulcate ; gills veined - - *M. cætites* Fr.

51 { *a* Plicate, splitting ; gills *adnate*, veined - *M. plicosa* Fr.
b Striate, splitting ; gills *adnexo-free* - *M. consimilis* Cke.

52 { Greyish-brown ; cæspitose on stumps ; gills adnate, odour strong - - - **M. alcalina* Fr.
Not cæspitose, nor growing on wood - - - 53

* Often tinged pink or yellow, or wholly white.

53 { Grey, *glistening*, 2-3cm. ; gills veined, adnate with a tooth, odourless - - - *M. stannea* Fr.
Gills adnate, *not* toothed, nor veined. *Odour present* - 54
Umber, 1-2·5cm. ; gills as in 54 ; odourless *M. vitrea* Fr.

54 { *Entirely grey*, subgibbous ; *radishy* odour ; stem-base white-downy - -*M. cinerea* M. and Crossl.
Smell *alcaline* ; gills *whitish* - - - - - - 55

55 { Smell strong. Brown to greyish, firm *M. ammoniaca* Fr.
Smell weak. Grey, *soft*, *flaccid*, *hygrophanous* **M. metata*

56 { Orange-red, 3*mm.* ; gills and stem yellow *M. acicula*
Pellucid, white, 1cm., tufted ; gills uncinate *M. tenella*
Bluish-green, stem violet, base white - *M. virens* Q.
Pileus greyish or brownish - - - - - 57

57 { Gills *free* ; pileus campan. striate, greyish ; stem 6-10cm. 58
Gills adnate - - - - - - - - - 59
Gills adnate to a collar, whitish then pinkish. Pileus brownish-grey, 1-2cm. - *M. collariata* Fr.
Gills plano-decurrent, white. P. brownish 1cm. *M. speirea*

58 { 1-5cm. ; gills white ; stem base downy - *M. filopes* Fr.
0.5-1cm. ; gills grey ; stem pulverulent-downy - *M. amicta*

59 { 6*mm.*, papillate, brownish, *striate*, stem 6-14cm. *M. vitilis*
Pileus larger 1-2cm., stem up to 8cm. long - - 60

60 { Whitish to brownish, striate, rugulose - - *M. debilis*
Entirely lead-colour, expanding ; stem 5-8cm. - - 61

61 { *Sulcate*, white *pruinose*, stem same ; odourless *M. plumbea*
Edge striate ; stem *glabrous*, base white-downy. Odour of radishes *M. cinerea* M. and Crossl.

62 { White, 1mm. ; stem *with spreading hairs* - *M. setosa* Fr.
White, 2mm. ; stem 2cm., *hairlike*, *glabrous* *M. capillaris*
Rufescent, rosy, 3mm. ; stem glabrous - *M. juncicola*
Larger, 4-7cm., colour variable ; stem scurfy-downy - 63

63 { Blackish, bluish, brown or grey, *striate* ; gills ovate, ovate ; cystidia present - - *M. corticola* Fr.
Flesh colour, brownish or white, edge striate ; gills linear ; cystidia none - - *M. hiemalis* Fr.

* Often tinged pink or yellow, or wholly white.

MANCHESTER FIELD NATURALISTS.

On November 18th, at the opening meeting of the winter session of the Manchester Field Naturalists' and Archæologists' Society, Miss G. Wigglesworth, M.Sc., botanical curator of the Manchester Museum, gave a lecture on "Seaweeds," illustrating her remarks with a large number of specimens. The flora of the sea was compared with that of the land. It is found that only a few "flowering plants" are to be found in the sea, namely, the sea grasses, whilst ferns and mosses are entirely absent; the main bulk of the vegetation consists of algæ commonly called seaweeds. Although much variety of structure is met with amongst seaweeds on the whole they are of much simpler construction than are the land plants. No true roots, stems, and leaves can be distinguished, although some of the more complex have root-like and leaf-like organs. There is a corresponding simplicity in their internal structure and in their mode of life. The colouring of seaweeds is of great interest. All seaweeds contain the green colouring matter (chlorophyll) characteristic of plants, but in addition to this many have a brown and a large number have a red colouring matter in addition to the green, and in these cases the green is hidden by the brown or red colour, as the case may be. The relation of the colours of seaweed to their distribution was briefly discussed; also the effect of temperature, light, density of the surrounding mediums, and ocean currents. Seaweeds belong to the group Thallophyta, which includes the simplest of all plants. This group also includes a large number of non-green forms (fungi), in addition to the algæ. A few words about collecting and preserving seaweeds were added, and some of their economic uses mentioned.

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On December 4th, the members of the Microscopical Section of the Preston Scientific Society had as the subject before the meeting "Plant Histology." Two instruments were in operation, and for an hour and a half the members were keenly interested in the structure of leaves and stems of plants. Various specimens of mosses and ferns were shown, together with pollen grains.

On Dec. 9th, at a further meeting, the amateur members were invited by the secretary, Mr. John Abbott, to make use of the instruments and slides provided, and by varying the objectives, the position of the illuminant, etc., to try their hands at getting the best results for viewing various objects, including both opaques and transparencies. He afterwards pointed out where mistakes had been made, and thus very valuable hints were obtained.

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EDIBLE BRITISH MOLLUSCA.

On December 6th, at the lecture usually accompanying the special exhibit of some portion of tbe Manchester Museum's collections, on the monthly open Wednesday evening, Mr. R. Standen illustrated his remarks by showing a large and deeply interesting series of the various species of shell-fish used generally, or locally, in the British Isles, as food or bait. This series, which he had prepared specially as part of the Museum's exhibit at the Fisheries Exhibition held recently at Rusholme, where it attracted much attention, has now been arranged for public inspection in the Shell Gallery of the Museum. He said that in these days, when so much attention has been directed towards the cultivation of the Oyster, Cockle, Mussel, and some others of the common kinds of eatable shell-fish, it is surprising that the importance of many others, equally nutritious, which are universally eaten on the Continent, has been hitherto almost entirely overlooked. The Oyster, Mussel, and Common Cockle are well-known to most people, and in a less degree so are the Periwinkle, Whelk, and Scallop, but many other kinds of Mussel, Mya, Solen, Mactra, Pecten, the larger species of Cardium, the Limpet, etc., although they abound on many parts of our coasts, are seldom, if ever, seen in our markets, and are only used locally as food, whilst the proper modes of cooking them are scarcely known. Yet many of them might be cultivated as easily as Oysters, and form equally valuable articles of food, if only local prejudices could be overcome. A notable feature of the exhibit is a fine series of Whitstable Oysters, presented by the Whitstable Oyster Company, showing various growth stages, from the "spat" to marketable "natives." The value of our Oyster fisheries is immense. The Whitstable fishermen have taken as much as £50,000, for native Oysters alone, during a single season, and this is only one fishery amongst many. The Mussel, Cockle, and Whelk fisheries come next in importance, and are little less remunerative. The Cockle is our principal Lancashire shell-fish, and great numbers are obtained from the wide expanse of sandy flats along the shores of Morecambe Bay. These have, under the name of "Cark Cockles," a well-deserved reputation for delicate flavour, though they are, as a rule, not so large as from elsewhere. The chief seat of the cockling industry of Morecambe Bay is the ancient, quaint, old-world village of Flookburgh—proud of its charters for fairs and markets of Edward I. and Henry IV. dae, rectified under Charles II. As many as 3,162 tons of Cockles, at an average of £2 8s. per ton, have been sent out in

one year from this little village to the markets of Preston, Manchester, and towns of East Lancashire, and West Yorkshire. But of late years the yield has decreased, especially since the awful frost of the winter of 1895, when the bay was piled up with ice, and presented a perfectly Arctic appearance, killing the Cockles by millions, and bringing the total output down to 822 tons. But the trade is again on the increase, the yield, according to statistics for 1908, having risen to 1,290 tons, and following the experiment made in the spring of 1909 of transplanting 144 bags of Cockles from Silverdale to Cark, there is every prospect of an improvement in the industry. A large series of the various shell-fish used in America under the comprehensive name of "clam" was also shown. Many of these are identical with, or closely allied to British species which are but little known or used in this country, though common enough in many parts of our coasts. One notable example is *Mya arenaria*, known in America as the "soft clam," and held in high esteem there. Hundreds of fishermen are employed in gathering it, especially in winter time, when nothing else can be done, and it is estimated that not less than a million and a quarter bushels, valued approximately at 600,000 dollars, are fished annually along the Atlantic seaboard ; many are sold as bait to the cod fishers, but large numbers find their way to the markets as food, and are prized alike by rich and poor.

Mr. Standen's remarks on the species shown were closely followed by a keenly appreciative audience, amongst whom were several specially interested in food and fisheries, and general satisfaction was expressed when, in reply to questions, he announced that it was proposed to keep the exhibit on public view in the shell-gallery of the Museum.

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Dr. Watterson, Medical Officer of Health for Morecambe, addressing a gathering which included Mr. N.W. Helme, M.P., and Mr. C. E. Fryer, Chief Inspector of Fisheries to the Board of Agriculture, declared that mussels and cockles. properly cooked and taken from a proper place, were the most nourishing of foods. If people realised their immense vitalising and digestive value they would, instead of being sold for a penny a quart, realise as much as oysters. The consumption of more mussels and cockles meant a stronger, healthier nation.

—o—

It is pleasant to hear that the Heron is on the increase in the Ribble Valley. Evidently the efforts of Mr. A. Taylor, of Whalley, and others to protect these birds have met with success.

NEW BOTANICAL LABORATORIES AT MANCHESTER UNIVERSITY.

By kind courtesy we are enabled to reproduce two illustrations of the new Botanical Laboratories at Manchester University, to the opening of which we referred last month.

When Owens College was first founded, Professor W C. Williamson was elected Professor of Natural History and had the oversight of the subjects of Geology, Zoology, and Botany. In 1872 matters had so developed that Professor Boyd Dawkins was appointed Professor of Geology, and again in 1879 it was found necessary to institute an independent Professorship of Zoology, which was offered to the late Professor Milnes Marshall. For forty years Professor Williamson held office, and during that time his wonderful investigations into the fossil plants of the Coal Measures not only enhanced his own reputation, but laid the foundation of a high reputation the College and subsequently the University has held, and his Memoirs still remain the standard work for all investigators in this branch of Botany.

Professor Williamson resigned his position in 1892, and at that period the department reserved for botany was conducted by the Professor of Botany and one assistant, the late Mr. Thomas Hick. Since then the growth in the number of degree students, and the specialisation of the subject have necessitated great extensions, and the late Professor Barker, for many years Professor of Mathematics in the Owens College, but an ardent student of mosses, left at his death in 1908 a sum sufficient to establish a Professorship of Cryptogamic Botany and to allow for bursaries in mathematics. The staff at present consists of: Harrison Professor of Botany : F. E. Weiss, D.Sc.; Barker Professor of Cryptogamic Botany : W. H. Lang M.B. D.Sc., F.R.S.; Lecturer in Plant Physiology: D. Thoday, M.A; Lecturer in Agricultural Botany : T. G. B. Osborn, M.Sc.; Assistant Lecturer and Demonstrator : Edith M. Kershaw, M.Sc.

Students working in the department of botany are mainly preparing for the Ordinary or Honours Degree in Science, in some cases for the more specialised science degrees in Agriculture or Pharmacy. Classes are also held for medical students and for training students, while for a score of years an evening class in botany has been held in the winter. Research work has been a prominent feature, this being encouraged by the Platt Biological Scholarship, which is shared with the Zoological Department. Among the past students and members of the staff may be mentioned :—1878, Marcus M. Hartog, D.Sc., now Professor in Queen's College, Cork ; 1883, H. Marshall Ward, Sc.D., F.R.S., late Professor of Botany in the University of Cambridge ; 1886, Thomas Hick, B.A., B.Sc.; 1896, F. W. Keeble, M.A., D.Sc., Professor of Botany, University College, Reading ; 1898, O. V. Darbishire, M.A., Ph.D., Lecturer in Botany in the University of Bristol ; 1905, C. E. Moss, D.Sc., Curator of the Herbarium in the University of Cambridge ; 1907, H. S. Holden, M.Sc., Lecturer in Botany, University College, Nottingham ; 1908-10, Marie C. Stopes, D.Sc., Ph.D., Lecturer in Palæobotany.

It has been recognised for some time that there was a great need for increased laboratory accommodation for botany, and temporary relief only has been afforded by various extra facilites granted from time to time. By the erection of the new block of laboratories the requirements of botanical work are met with freedom from noise ; the vacation of the Beyer wing will give additional accommodation for the Geological Department ; and the difficulty experienced in having two sets of botanical laboratories so widely apart will be obviated.

For Palæobotany a room is set apart on the ground floor, on the south side of the building, while on the north is a well-lighted laboratory for junior students, connected directly with the larger elementary laboratory in the main building. On the first floor is a large research laboratory, and adjoining this is a small preparation room which has temporarily been turned into

a departmental library for works of reference and for the valuable collection of pamphlets used by the staff and the students. The second floor is devoted entirely to the Cryptogamic Department. There are private rooms for Dr. W. H. Lang, a large research laboratory with preparation room, and a small room set apart for the incubators and sterilisers for mycological investigations in connection with plant diseases. This laboratory will also be available for such enquiries connected with agriculture as have been carried out by Mr. Osborn.

The laboratory for Plant Physiology occupies the third floor, designed so as to possess both north light for microscope work, and south and west light for experiments requiring direct sunlight. These experiments can be made in the laboratory itself or in the greenhouses, which occupy the whole extent of the south front of the top floor. The new botanical block is entirely devoted to laboratory accommodation, and does not contain any lecture rooms or museum galleries. For the time being the lectures are intended to be given in the Natural History Lecture Rooms in the Beyer wing.

The Council of the University are to be commended for their prompt recognition of the necessity for the new laboratories, and it is sincerely to be hoped that their appeal for funds to meet the large expenditure incurred may meet with a ready and satisfactory response.

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Mr. A. Taylor, of Whalley is compiling a work which has for its object that of showing what Lancashire is capable of producing in the way of bird life. This will deal particularly with the birds of prey.

At a recent meeting of the Manchester Literary and Philosophical Society, Mr. C. L. Barnes demonstrated the dangerous nature of a mixture of magnesium powder and silver nitrate, to which attention had been drawn by Mr. Harold Calam. A paper entitled "The Synthesis of Hydrocarbons and their Stability at High Temperatures and Pressures," by Dr. J. W. Pring and Mr. D. M. Fairlie, was communicated by Dr. Pring.

LIVERPOOL BOTANICAL SOCIETY.

In connection with the school children's nature study scheme promoted by the Liverpool Botanical Society, a very interesting exhibition of young people's work was held on December 16th in the Hartley Laboratories of the University. Drawings of plants and flowers, with essays on certain aspects of botanical study, were ranged on long tables, and formed tangible evidence of the Society's efforts to stimulate among school children a love of nature study. The response made by the boys and girls in Liverpool and Cheshire secondary and elementary schools to the Society's offer of prizes was indeed most encouraging. Mr. W. T. Haydon, President of the Society, took the opportunity at the prize distribution of addressing the young folks. He reminded them that there were still roads and lanes untouched by the motor car, where wayside flowers and plants abounded, and where there was ample scope and reward for the youthful naturalist.

After the Presidential address, the prizes were presented to the successful competitors by Miss Haydon.

Mr. A. A. Dallman, hon. secretary, submitted the sub-committee's report on the scheme. This stated that the committee appreciated the difficulty of botanical study in a large city, and attempted, in arranging the subjects for competition, to give a chance to schools not so favourably situated as others. The number of competitors from the secondary schools was small, but a high standard was attained. In the competitions for elementary schools, the committee were somewhat disappointed that more schools did not enter for certain groups. In other sections, however, the adjudicators had great difficulty in arranging the many excellent drawings.

Mr. Delaney, who took an active part in working out the details and arrangement of the exhibition, gave some account of the objects which were on view, which he considered very satisfactory for a first effort.

After a vote of thanks to the Chairman and Miss Haydon, proposed by Mr. J. A. Wheldon and seconded by Dr. Lee, an interesting hour was passed in examining the papers and drawings sent in from the various schools.

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An interesting paper on "Artificial Fly for Angling" was read by Mr. Leonard West at the November meeting of the Manchester Anglers' Association. In describing the materials used in the construction of the artificial fly, he said they were legion, feathers of all descriptions, from the small ones taken from the jenny wren or blue tit, to the largest quill feathers from the eagle, condor, heron, or other large bird. Mr. West described the various methods of manufacture, and had useful hints to offer as to meeting the variation of useful flies in different waters. The chief interest to the naturalist was the exhibition of specimens of artificial flies, and a number of plates of natural insects (coloured), with their imitations side by side, all drawn from nature one and a half times natural size, comprising over 100 varieties and over 300 figures.

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The autumn soiree of the Manchester Field Naturalists, held at the Midland Hotel, was a very successful gathering. Sir William H. Bailey presided, and gave a retrospect of the Society's work since the meeting in spring. A fine musical programme was gone through, and there were the usual exhibits in entomology, botany, and philately. A group of microscopes also provided a rare attraction.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

The Little Auk in Lancashire.

On November 8th, after the big storm of the previous Sunday, a Little Auk was picked up by one of Major Ormrod's gamekeepers on the main road between Scorton and Garstang, Lancashire. The keeper took it to Wyresdale Park, and put it in the gun-room, where it laid for several days, and was finally given to one of the stud grooms, Mr. Mudd. He sent it on to Mr. H. Murray, of Carnforth, who does a deal of taxidermy for Major Ormrod. The bird was a male and was very thin, and had possibly lived a day or two after its buffeting. The place where it was picked up would be about four miles from the coast.

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Trollius europæus in the Brinscall District.

It is interesting to note in the November number of the *Lancashire Naturalist* the confirmation of the record of *Trollius europæus* in Brinscall district. The previous record was based on information given by Mr. W. Mackay Wood, who had seen it some years ago, but not in the locality of Tockholes, so the latter is evidently a new station for it. The writer has recorded *Trollius europæus* from near Chorley, but was not aware of its present occurrence within the Brinscall radius.

Brinscall, December 2nd, 1911. G. H. Hopley.

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Vanessa urticæ in Hibernation.

On Dec. 2nd, while my children were playing near the end of the kitchen oven, they discovered a specimen of *Vanessa urticæ* crawling out from behind some plaster that by the heat had detached itself from the wall. The oven had been used the previous day, and possibly the place it had chosen for its winter quarters had become too warm for it. Beyond the rubbing off of some of the scales the insect is perfect. It never was thoroughly restored, crawling about in a lethargic manner, and on being taken into a cooler room at once settled down again. When it has got into this position is a question not easy to solve. We have only resided here since early October, it is in the heart of the town, and previous to our taking the place it had been shut up for a few months.

W. H. Western.

ITEMS OF INTEREST.

The Blackburn Field Club held a meeting on Dec. 6th, when Mr. A. Taylor, of Whalley, lectured on "Some Land Birds and Sea Birds." The former birds were illustrated by slides from lovely photographs taken by the lecturer himself in Lancashire. These comprised a series illustrating the nesting of the Heron in the Ribble Valley; the Short-Eared Owl on one of the local moorlands; the Merlin on Pendle Hill; a young Cuckoo being fed by fosterparent; young Blue Tits and Dippers; indeed a fine and unique set of slides altogether. The second portion was a photographic record of a personal visit to the Yorkshire coast.

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A members' evening held at the close of November in connection with the Darwen Naturalists' Society was very interesting. Mr. A. Dickson laid on the table plants of "Honesty," and he made some interesting remarks on seed-vessels in general. Mr. Jas. Gibson exhibited a few species of local Fungi, and commented upon the characteristic features of each. Mr. C. F. Grey had a nice display of Chrysanthemums, and he not only gave a history of the plants, but went into details as to growing them, the composts necessary, and how satisfactory cuttings were to be taken. Mr. Kershaw displayed an assortment from India comprising snake skins, centipedes, scorpions, beetles, and other objects of interest. Mr. H. Woods showed a series of clutches of birds' eggs in order to refer to the wood pigeon's white eggs, unusual for a nest open to the light. An interesting question was raised by Mr. Taylor as to the failure of ash trees in a nursery, and this was much discussed. It was later found that the trees were water-logged. Mr. J. H. Morton had also a miscellaneous assortment of larch twigs, mosses, etc.

LANCASHIRE AND CHESHIRE ANTIQUARIAN SOCIETY.

On December 8th, at the meeting of the Lancashire and Cheshire Antiquarian Society, a short communication was read by the secretary on behalf of Prof. Boyd Dawkins. This had reference to "The find by Mr. T. E. Morrow of a prehistoric implement in the alluvium of the River Mersey at Irlam." A section was shown of the excavations for the power station for the Partington Iron and Steel Company in the course of which the implement was found, at a depth of thirty-two feet. It lay twelve feet above sea level in a thick bed of gravel overlying the Bunter Sandstone, and above it were layers of sand, sandy marl, black silt, and vegetable matter. The implement is of a flat, discoidal shape, and is perforated in the centre. The Neolithic Age is the period to which Professor Dawkins has assigned it, and he declares that this interesting discovery proves the presence of man in the district during the accumulation of the lower gravel in the stream of the Irwell.

Miss G. Hewitt exhibited some African money and curios, and a photograph of a circular candelabrum at Bristol was displayed by the Rev. H. A. Hudson, one which he had not been able to place on view when he read his paper at the previous meeting.

A bronze palstave that had been found at Liscard some years ago by Mr. Edward Ledson, was exhibited by Mr. W. Bowden. This, which pertains to the Bronze Age, and is of a similar nature to others found in Lancashire and Cheshire, was obtained from Liscard Moor. It was taken in a layer of black vegetation and sand four feet below the surface.

Mr. C. W. Sutton displayed a small MS. compendium of English statutes written in the fifteenth century, and which was found in premises at Hanging Ditch.

Dr. W. E. A. Axon's contribution was a black letter reprint of a rare and quaint book, "The Lamentable Vision of the Devoted Hermit." This is a slender folio of eight pages, and several woodcuts reproduce the illustrations of the MS., which has been assigned to the early part of the thirteenth century.

Mr. J. Harold Gibbons, A.R.I.B A., read a paper on "The Royal Shrine at Westminster as it may have been at the end of the fourteenth century, with some suggestions for the use of colour in churches of the present day." This was a capital paper, and incidentally Mr. Gibbons deplored the lack of taste exhibited in the selection of materials for use in the erection of modern churches.

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The Passing Hour.

At Croston Barn Farm, Cabus, Garstang, on two days during the first week in January, 4lbs. of *Agaricus campestris* were collected, one weighing 3oz.

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A lecture was given in connection with the Leyland Naturalists' Society on January 4th, when Mr. R. d'A Morrell dealt with "The Struggle for Existence in the Insect World." This was particularly interesting from the fact that some of the slides used had been prepared by colour photography. The specimens shown included examples from Leyland and Grange.

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On January 3rd the death occurred at St. Annes of Mr. A. R. Rogerson, of the firm of Messrs. Rogerson and Sutcliffe, solicitors, Manchester. He formerly resided at Prestwich, and was for some years Clerk to the Prestwich Local Board. For a quarter of a century he had resided at St. Annes, and had interested himself in the lifeboat work, being continuously a member of the lifeboat committee, and at one time coxswain of the lifeboat crew. He was also a member of the Lancashire and North-Western Sea Fisheries Committee. He took a deep interest in scientific work, was particularly partial to botany, and his garden at the Bungalow was partly given over to the many rare and unique plants of the sandhills about. On this account many visits were paid to his residence by botanical societies. He was a successful exhibitor at the horticultural shows.

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The seismograph at Stonyhurst Observatory referred to in our last number is the identical instrument used by Captain Scott, R.N., in his first South Polar Expedition.

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Many copies of our December number, singly and in parcel, went astray during the heavy Christmas deliveries. Will any of our subscribers who have not seen that number kindly notify us at once.

May we be allowed to point out to our Ornithological readers that the reception of the magnificent Dresser Collection of Birds' Eggs in the Manchester Museum is conditional. Mr. and Mrs. Dresser have temporarily placed these in the Museum in order to give the Committee opportunity to raise the sum of £1,000 necessary for their purchase. This sum is only a third or perhaps quarter of their market value, and it is greatly to be hoped that Lancashire people will make a huge effort to retain in the county (and probably in this country, as otherwise it is almost sure to go to America) this unique collection. It could find no better or more fitting home than in the Museum where already repose other fine collections of the same great Ornithologist, in an institution rapidly acquiring the very finest private collections in all branches of natural science, and the authorities should receive the ready support of all naturalists in their endeavour to retain this remarkable collection in the county.

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Among the new Knights in the Durbar honours conferred by the King in connection with the Indian visit, appears the name of a Darwen gentleman, Mr. Ralph Percy Ashton, the present President of the Mining and Geological Institute, Calcutta. The son of Mr. Ralph Shorrock Ashton, B.A., J.P., now of Lee, Kent, Sir Ralph Percy Ashton was born at Earnsdale, Darwen, in 1860, and on completing his education took an active part in the management of the New Mill at Darwen, with which his father was connected. In 1883 he went out to India in the service of Messrs. Kilburn and Company, to which firm he was admitted a partner in 1900. He served on the Council of India in 1900-1 and in the following year, and having developed an extended knowledge of scientific subjects, he was able to give much valuable advice upon the Mines Bill and the Electricity Bill passed during those periods. In January last he was elected President of the Mining and Geological Institution of India, dealing in his Presidential address with the subjects of "Sanitation and the responsibilities of mine owners to their workmen," and "The educational value of the Institution in the Indian social system."

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At the opening meeting of the sixth annual gathering of the Historical Association, held at the Whitworth Institute, Manchester, on Jan. 11th, Prof. Boyd-Dawkins gave an address on "Some Points in the Pre-history of Britain."

Work and Workers.

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MR. JAMES COSMO MELVILL, D.Sc., F.L.S., &c.

Since his retirement into Shropshire a few years ago Mr. Melvill has not been so conspicuous as at one period he used to be. There was a day when his name was on every lip, when journal after journal contained either allusions to his work or published articles from his pen. He was an indefatigable worker, and has left a deep impression by the labours of his earlier years. He is by no means inactive at the present moment, as will be seen, keeping up his connection with Manchester, during his sojourn in which city the bulk of his principal work has been accomplished.

Mr. Melvill was born at Hampstead, Middlesex, on July 1st, 1845. He is a son of the late Mr. James C. Melvill, formerly Assistant Under Secretary of State for India, and grandson of the late Sir James Cosmo Melvill, K.C.B., F.R.S., who was for many years Secretary of the H.E.I.C.S., and first Director of the Indian Railways.

The love for scientific work has been a lifelong one. From a very early age Mr. Melvill became interested in Botany and Zoology. He was educated at Harrow School, and Trinity College, Cambridge, where he took his B.A. degree in 1868, and M.A. in 1871. When at school he received a great impetus to the development of his increasing passion for natural history by the consideration shown to his work by those in authority. He came under the influence of the Rev. Dr. F. W. Farrar, subsequently Dean of Canterbury, who encouraged the bent of his mind in every way, and induced him to prepare for publication the *Flora of Harrow*, 1864, a work to which he devoted considerable attention, and which has run through more than one edition, having been subsequently extended by the Rev. D. Marsden Hind, lately of Ixworth, Suffolk, and at that time Rector of Pinner, Middlesex.

After taking his degree in 1868, Mr. Melvill at first entered the business of his uncle, Mr. Edward Hardcastle, M.P., and some years later became a Director of the firm of Geo. and R. Dewhurst, Ltd., of Manchester, London, and Preston.

In 1871-72 he visited the United States, Canada, and the West Indies, and this voyage was fraught with great consequences. He sedulously studied the Flora and Fauna of these countries, making then a commencement of the exotic herbarium which subsequently (1904) was presented to the Museum of the Victoria University of Manchester. At the time of its presentation it was estimated to contain about 36,000 species of plants and over half a million specimens. He has still retained in his own possession the orders Gramineæ, Filices, Algæ, and remaining Cryptogamia, and is augmenting them yearly with additions from all parts of the world, and it is hoped that ultimately they will also find a place at the University Museum. There is also an almost complete British Herbarium, kept separate, he having been a contributing member to the Botanical Exchange Club of the British Isles for more than thirty years.

At the time of the last visit, in 1887, to Manchester of the British Association, Mr. and Mrs. Melvill gave a garden party, at which a great portion of his collections were exhibited, and, again, three years later, when the Museums Association visited the same city, they were shown, accommodation being temporarily found in the reception rooms of a large contiguous house, then untenanted. At that time the zoological collections consisted of Lepidoptera, Coleoptera, and Mollusca of the world.

In 1898, finding these accumulations growing too largely for a somewhat circumscribed space, he sold the first two of those just mentioned to Mr. C. H. Schill, and was therefore able to expand and increase the series of Exotic Mollusca, which at the present time is one of the finest in existence,

REFERENCE LIBRARY, SALFORD, PEEL PARK.

MR. JAMES COSMO MELVILL, M.A., D.Sc., F.L.S., F.Z.S.

numbering some 20,000 species, and being replete with unique types, and other shells of historic repute. He also still retains his British collections of Insects, and one of European Lepidoptera.

Twice, in 1890, and again in 1896, has he been elected President of the Conchological Society of Great Britain and Ireland, and on these occasions the subject of his addresses were "British Pioneers in Conchological Science" and "The Principles of Nomenclature, and their application to the Genera of recent Mollusca." He has also served on the Council of the Malacological Society of London, acting also as a Vice-President for some years.

In 1898-99, for two years he occupied the Presidential chair of the Manchester Literary and Philosophical Society, having for nearly twenty years served uninterruptedly as a member of its Council.

He has contributed over a hundred papers and essays, mostly descriptive, to various scientific Journals and Societies; the great majority of these dealing with recent Mollusca, either alone or in collaboration with Mr. John H. Ponsonby, Mr. Ernest Ruthven Sykes, or Mr. Robert Standen. Altogether, he has added over 1,100 species to the 38,000 recent Mollusca already chronicled, the chief part of his investigations having been directed to the elucidation of the marine shells of the Persian Gulf, the Loyalty Isles, Torres Straits, Andaman, and the Terrestrial Mollusca of South Africa—in this last assuming joint authorship with Mr. Ponsonby. He likewise worked out the large collections obtained in the Seychelles, Amirantes, and Cargados group by the Stanley Gardiner Expedition in 1905, and, in collaboration with Mr. Standen, the Antarctic shells, which were unusually interesting, found during the Scottish Expedition under Mr. W. S. Bruce.

Mr. Melvill, on the visit to Manchester in 1887 of the British Association, contributed to their Handbook the very interesting sections on Insecta and Mollusca, and his work in Lepidoptera and Coleoptera has been of great assistance to the compilers of manuals on the Fauna of Lancashire and Cheshire. In the latter (Coleoptera) he had the advantage of collaboration with Mr. J. Ray Hardy, of the Manchester Museum.

Since removing into Shropshire, eight years ago, he has been elected President of the Caradoc and Severn Valley Field Club. He is also a member of the Court of Governors of the Victoria University of Manchester, and served for many years on the Council, and likewise till 1906 was Chairman of the Museum Committee at the University.

In July, 1908, upon the occasion of the Installation of Viscount Morley of Blackburn, as Chancellor of the University, he received the distinction of a honorary degree of Doctor of Science. He is also a Fellow of the Linnean, Zoological, and Entomological Societies of London.

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THE COSMO MELVILL HERBARIUM.

The first beginnings of the Herbarium presented to the Manchester Museum in 1904 took place from 1864 to 1868, a series of Cape plants collected by Ecklon and Zeyher being obtained during Mr. Melvill's undergraduate days at Trinity College, Cambridge. In 1868 considerable gatherings were made during a visit to Switzerland and the Rhine. During a visit to the United States, Canada, Cuba, etc., in 1871-1872, over 1,000 species were collected and classified, in addition to about 200 Marine Algæ from the Florida Keys, of which some were new to science. For many years then the plants of Europe were mainly added, when in 1882, through the medium of Mr. F. J. Hanbury, was secured a very perfect series of the plants collected in India by the late Sir Joseph (then Dr.) Hooker and Dr. T. Thomson; also Gardner's Brazilian, and other well-known collections. In March, 1889, was acquired the vast Herbarium of the North Temperate Zone (exclusive of Great Britain and Ireland) formed by Dr. John Irvine Boswell

Syme, estimated to contain about 250,000 separately labelled examples, and this necessitated the erection of a special building for its accommodation, and they were stored in a two-roomed house of corrugated iron, each room measuring nearly twenty feet square by fifteen feet in height.

From 1882 every opportunity was taken of making the collections as representative as possible (especially of generic series and endemic forms) and from nearly every country—arctic, temperate, and tropical—suites of specimens were obtained, the most noteworthy additions during the twenty-two years being, perhaps, Dr. Augustin Henry's Chinese collections; a full set of C. G. Pringle's Mexican plants, 1885-1900; Dr. H H. Rusby and Miguel Bang's Bolivian, and Orinoco collections; Dr. Ralph Tate's South and Central Australian; and a very perfect series of New Zealand plants, collected by Dr. T. Kirk and Mr. Richard Helms.

In the Herbarium are included a large collection of New South Wales plants, named and certified, or described by Sir J. E. Smith, founder of the Linnean Society, being a duplicate set of the Australian collection in his Herbarium, now in possession of that Society, at Burlington House; about 300 species of *Erica* mainly from the Cape, named by Mr. G. Bentham, author of the monograph of the genus in De Candolle's "Prodromus"; large series of specimens collected in North America, especially the Western States, by Mr. Thomas Nuttall, with his autograph tickets and labels, being all co-types of species described by him. There are a few from the Hawaiian Islands, and several of Pursh's and other old American authors' specimens; Arctic plants, collected during the Franklin expedition; Schrenk's Siberian and Lake Balkash Exsiccata; a complete set, with all his types; a set of Alexis Jordan's critical European species, also those of Boreau, Lejolis, etc.; plants collected by C. Darwin, F.R.S., during the voyage of the "Beagle," in Cocos Keeling Islands, and a few of his Galapagos Island gatherings; some specimens with autograph tickets of Linnæus.

Of genera, roundly speaking nearly 5,000 of the 7,500 admitted by Bentham and Hooker are represented, constituting two-thirds of the total; and, besides these, several instituted since 1883 (the date of the publication of the third and final volume of the "Genera Plantarum") are exhibited in this Herbarium.

THE UNITED FIELD NATURALISTS.

The meetings of the United Field Naturalists that are held at Oldham are always interesting, and the one held at the room of the Central Free Library in that town in December was no exception to the general rule. Indeed it was one of the most successful held under the auspices of the Society in recent years. There was a welcome return at the morning meeting to those little demonstrations that have invested the proceedings with so much charm in the past. Mr. J. H. Stopford presided, and expressed thanks to the Free Libraries Committee for the privilege granted of meeting in their buildings. The annual election of officers resulted as follows: President, Mr. J. H. Stopford (Shaw); vice-presidents, Messrs. J. Waddington (Paignton), Seth Radcliffe (Mossley), W. Osbaldeston (Rochdale), J. Tetlow (Oldham), A. Binns (Manchester), D. Gartside (Delph), and W. Mackie (St. Annes); committee, Messrs. R. Jackson (Stalybridge), J. Maiden (Shaw), Tom Taylor (Oldham), F. Williamson (Rochdale), S. Radcliffe (Dukinfield), and Cotterill (Manchester), with Mr. A. P. Bradshaw hon. sec., and Mr. A. Matthews, auditor. This year the Society will meet at Stalybridge in March, Carr Wood, near Rochdale, in June, Delph in September, and Manchester in December.

The Exhibits.

Mr. C. Ledger dealt very ably with the few botanical specimens laid on the tables.

Mr. F. Taylor had a very interesting series of eggs on view. These clutches represented the Shelduck, Eider, Pintail, Teal, Goldeneye, Long-tailed, Mallard, and Scaup. This neat and attractive exhibit led Mr. Fred Taylor to show how the species can be distinguished by the different colouring of the eggs, and by the down with which the nests are lined. From Hampshire Mr. Taylor had received for exhibition and disposal a number of slides illustrative of minute fossils from the Tertiary formations, and for the most part new species, or of species new to Britain, discovered in the cliffs of Barton and Hordwell, near Christ Church, and in the Isle of Wight during the operations of the British Natural History Society. Enlarged lithographic figures illustrated the fossils, these being the work of Mr. W. Smith, late a pupil in the York Government School of Design.

Mr. Tom Taylor enhanced an already fine reputation for his nature photos. by his exhibit on this occasion. The pictures of animals, plants, and birds were delightful. The slides shown illustrated the Common Tern, the Kittiwake, the Black-headed Gull, the Red Grouse, with nest and surroundings, and four of the leopard from the King's collection of animals, taken in the London Zoo.

A Curious Parasitic Worm.

A subject that has occupied the attention of many people during the past couple of years was introduced by Mr. Halbert. The sticklebacks in the Park boating-lake are nearly all infested with a parasitic worm, *Bothriocephalus dimorphus*, in one fish alone no fewer than thirty-eight were found, varying in length from one inch to an eighth of an inch. This species requires two hosts in which to complete the cycle of its existence. The first stage is passed in the tissues of some fish; the fish is then inferably swallowed by some bird frequenting the water, and in the body the further development of the worm is continued until maturity, when eggs are conveyed with the excrement of the bird into the water, become attached to plants and hatch out into embryos that swim freely about and are in turn engulphed by fish again. It was at one time surmised that the ducks that exist in the park acted as hosts, and it was suggested that investigation be made, but this appears to have been passed over. Mr. Halbert suggested this procedure. It would be of further interest because it would show whether there was the probability of its being transferred to man like the allied species, *Bothriocephalus latus*, which Mr. Halbert referred to as passing the second stage of its existence in the intestinal canal of man, being chiefly conveyed thereto through the agency of insufficiently cooked pike. The specimen he had mounted for lantern purposes attracted much attention.

Insectivorous Plants.

A rather unique exhibit was that supplied by Mr. Abel P. Bradshaw, who had brought a few specimens of pitcher plants. After the last meeting at Ashton a few members had visited Stamford Park. Here a few pitcher plants had been seen, and Mr. Bradshaw had asked one of the gardeners to supply him with a specimen to illustrate a lecture he was then due to give. The one he first commented on had on the occasion of their visit been supplied with a cockroach, and he understood that it took 12 days before it had disappeared. Since then it had been supplied with several cockroaches, and at that time it contained nothing but the hard, indigestible parts such as the wings of the insect. From a conservatory in the Manchester district Mr. Bradshaw obtained *Sarracenia purpurea*, and he showed how this plant arranged its leaves in the form of a large deep saucer

and providing appendages for the access of ants and beetles, obtaining thereby a good supply of food. By a coloured appendage at the top of the leaves it has provision by which insects such as moths and butterflies are attracted to it. In *Cephalotus follicularis*, a native of Australia, and one of the smallest of these plants, was demonstrated the development of a beautiful and intricate trap from a simple leaf-like form. The habits of the whole of this extensive class of plants were dealt with, and the points of view of those who believed that these special contrivances were but water receptacles, and those who contended that they were arranged solely for the capture of insects for the purpose of providing food for the plants that was not in the soil were freely ventilated. Mr. Bradshaw held tho opinion that they were insect capturing apparatus, and in response to various questions as to the probable benefits to be derived from this process instanced the results obtained by Darwin and his son, who in experimenting with the English sundew had proved that the difference in fed and unfed plants was 50 per cent. in favour of the former in the production of foliage, flowering stems, and flowers, and in the resultant seed capsules. A question was also asked as to the size of the captures made by the pitcher plants, and mention was made of *Nepenthes bicalcarata*, a Malay species, with pitchers capable of holding five to eight quarts of water, and which often contained bodies of the wild rock pigeon, and young lemurs occasionally got entangled in them by going to them in search of food. Mr. E. Bradbury also gave his experience in the keeping of some he had brought from America and which were placed in the gardens of the Ashton-under-Lyne Botanical Society.

Well-preserved Moss in a Peat Deposit.

Mr. Horsfall had met with deposits rich in moss and other vegetable remains from a layer of well-preserved peat that had been uncovered half-a-dozen feet below the surface in excavating in Lees market ground.

"Heredity."

In the afternoon Mr. H. E. Lees lectured on "Heredity" in the Art Gallery before a good attendance. The lecturer referred to the confusion existing in regard to the term heredity. People were apt to think that heredity was simply concerned with the peculiarities of the living organism. It was not a question of peculiarities; similarities, or the tendency of one organism to produce its like were of more importance than peculiarities. Briefly surveying the theories held from the time of the ancient Greeks down to those of Darwin, the lecturer conveyed a good impression of a deep and far-reaching subject.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 309.)

Naucoria Fries.

Usually brown, small, and growing amongst grass, on wood, or leaves, etc.

1 { Smooth or naked; veil absent or not conspicuous ... 2
Squamulose or atomate; veil evident; spores ferruginous 26

2 { Spores rust colour, not dingy rusty-brown 3
Spores and gills brownish-rusty 19

3 { Ochreous- or *lurid-green*, 2cm.; g. adnate *N. centuncula*
Bay-brown, edge tan, 2-4cm.; *smell rank* *N. cucumis* Fr.
Ochreous. 3cm., campan. stem *white*, *striate* ... *N. striæpes*
Without these characters 4

4 { *Plicate*, umbil., 1cm., cinnamon, convex *N. rimulincola* Rab.
Striate at margin, or pellucidly striate, 1-3cm. diam 5
Pileus even 10

5 { Reddish-brown, convex, 2-3cm., stem paler, white-fibrillose, base woolly; gills adnate *N. innocua* Fr.
Without these characters 6

6 { *Conical*, 3cm., ochreous, stem *fusiform*, brown *N. cidaris*
Acutely umbo., 3cm., tan or tinged green *N. nasuta* Kal.
Obtusely- or *subumbonate*, campan. to convexo-plane 7
Obtuse, *campan.*, 3cm., tawny; g. broadly adnate *N. obtusa* C. & M.

7 { Rusty-tan, 2cm., stem brown, *white-squam.* *N. badipes* Fr.
Tawny; 2cm., stem *paler*, *apex white-mealy* *N. melinoides*
Stem *fuscous or umber*, at least at base; paler above 8

8 { Wax-colour then ochre, 2-4cm., *becoming orbicular*, stem *naked*, gills broad, adnate *N. cerodes* Fr.
Brownish, edge ochreous, 2cm.; stem wavy, *adpressed-fibrillose*, *umber* ... ... *N. camerina* Fr.
Stem *white-mealy*, at least above 9

9 { 2cm., rusty-bay. gill edge downy, adnate *N. scolecina* Fr.
3cm., cinnamon, viscid, gills uncinate... *N. sideroides* Fr.

10 { Pileus subglobose or nut-shaped, 2-3cm.; gills ascending 11
Soon *flat*, *orbicular*, 2-3cm., viscid, rusty-tan, stem same ; gills adnate ... *N. abstrusa* Fr.
Campanulato-convex then expanded, gibbous ; 3-7cm.; gills free or slightly adnexed 13
Convexo-plane or hemispherical, 4mm.-1.5cm., gregarious 16

11 { Yellowish, *subviscid* ; stem *striate*, paler *N. subglobosa* Fr.
Pale chestnut-brown, edge much incurved ; stem even 12

12 { *Umbilicate*, lobed ; gills waved, cinnamon *N. nucea* Bolt.
Obtuse ; gills broad, *serrate*, *umber*. *N. glandiformis* W.G.S.

13 { Ochreous, margin silky-zoned ; stem brownish, *white-fibrillose*, gills linear ... *N. anguinea* Fr.
Stem not covered with white fibrils 14

14 { Stem *fusiformly-rooting* ; gills *free*, broad, *ventricose*... 15
Bay-ferruginous to ochreous, 3-5cm.; gills *attenuato-adnexed* ; stem pallid, *equal* *N. hamadryas* Fr.

15 { 4-7cm., pallid to rusty, often viscid ; stem pallid, ferruginous below ... ... *N. lugubris* Fr.
3cm., brownish-olive, whitish when dry, glutinous ; stem pallid, violet, etc. Variable... *N. festiva* Fr.

16 { Plane ; g. *adnexo-free*, rather distant ; stem incurved 17
Hemispherical at first ; gills *adnate*, rather crowded... 18

17 { 1-2cm., every part cinnamon ; on trunks *N. horizontalis* Fr.
Chestnut, *edge silky ; spores warted* *N. semiflexus* B. & Br.
4-7mm., whitish tinged rufous ; base downy *N. rubricata* B.

18 { Yellow, viscid, stem same ; among moss, etc..*N. pusiola* Fr.
Umbonate, bay to ochreous ; on wood *N. triscopoda* Fr.

19 { 2cm., *edge striate ;* rusty ochre, stem same *N. temulenta*
Not striate, 3cm.; stem *with rooting base*, 1in. long ... 20
Not striate ; stem *without* rooting base 21

20 { Convex-plane, tan-buff ; *stem powdered* *N. arvalis* Fr.
Subglobose, chestnut, *stem same*, *naked* *N. latissima* Cke.

21 { Gills adnate, with decurrent tooth ; pileus viscid ... 22
Gills adnexed or adnate 23

22 { Yellow, 3cm., stem *whitish ;* in *pastures* *N. vervacti* Fr.
Olive-brown then yellow, 3-5cm.; stem *brownish*, long. *In bogs*, *etc.* ... ... *N. Myosotis* Fr.

23 { Viscid. Stem usually rusty or olivaceous 24
Not viscid. By roadsides, pastures, etc. 25

24 { 3-5cm., tawny-rusty ; g. broad, crowded *N. semiorbicularis*
2cm., cinnamon or olivaceous, gills distant. ...*N. ienax* Fr.

25 { 3-5cm., rivulose, ochreous, stem same, subbulbous *N. pediades* Fr.
2cm., bay-brown, plane, obtuse, stem cinnamon *N. tabacina*

26 { Pileus 3-8mm., convex, atomate or tomentose ... 27
Pileus larger, 1-2cm., squamulose 28
2-4cm., viscid, tawny, *flocci saffron* ... *N. porriginosa* Fr.

27 { Tan-whitish ; stem scurfy ; on beech mast *N. carpophila*
Fuscous to fawn, papillate, tomentose *N. graminicola* Fr.
Ochre, punctulate, edge scurfy ; ring appendiculate. On lawns ... ... *N. sobria var. dispersa*

28 { Honey colour, slightly viscid, margin *pruinose* ; stem with silky spots ... ... *N. sobria* Fr.
Clothed with erect tufted fibrils, or scurfy 29

29 { Scales erect ; p. rusty-umber 30*a* ; reddish-rusty 30*b*
Scurfy ; bay to ochreous 31*a* ; whitish-tan to brownish 31*b*

30 { *a* *Umbilicate* ; stem *floccose to apex* ... *N. erinacea* Fr.
b Not umbilicate ; gill-edge flocculose ; stem peronate floccose to ring ... ... *N. siparia* Fr.

31 { *a* Convex ; stem cinnamon ; gills *adnate* *N. conspersa* Fr.
b Campan.; g. *toothed*, *or emarginato-free*. *N. escharoides* Fr.

Nolanea Fries.

Found in grassy places, or woods, especially in hilly localities.

Analagous to *Galera* and *Mycena*.

1 { Odour of rotten fish or cucumber ; pileus 2-3cm. ... 2
Without strong unpleasant odour 3

2 { Tawny-cinnamon, to brown, velvety ; in woods *N. pisciodora* Fr.
Fuscous or umber, flocculose. In swamps *N. nigripes* Fr.
Umber-black, edge paler, glabrous, papillate, hygrophanous. In grassy places *N. picea* Kalchbr.

3 { Gills grey or fuscous. Pileus dusky, hygrophanous 4
Gills becoming yellow or rufescent. Hygrophanous 9
Gills whitish, or shining white. Pileus 1-2cm. ... 10

4 { Grey, 3cm., stem mealy, base densely strigose with reddish fibrils... ...*N. fulvo-strigosa* B. & Br.
Base not red-strigose 5

5 { Grey, squamulose, 1cm., stem *brown-downy* *N. Babingtonii*
Stem striate or fibrillose... 6
Stem smooth 7

6 { 2-4cm., greyish-brown ; stem pale ; in pastures...*N. pascua*
1-2cm., dark grey, stem *grey*, with a *fugacious greyish cortina*. Under conifers. ... *N. araneosa* Quel.

7 { Fuscous to bay, then paler, 2-4cm., *papillate*, striate 8
Livid æruginous, 3-5cm., glabrous, convexo-plane ; stem greyish, silvery when dry *N. versatilis* Fr.
Sooty-umber, 2cm., subsquam., stem fuscous *N. juncea* Fr.

8 { Gills sinuato-adnate, spores 10-11 x 6-7*u* ; stem base white-tomentose ... ... *N. papillata* Bres.
Larger ; gills adnexed, spores 7-8 x 5-6 *N. mammosa* Fr.

9 { Red-brown, *subumbil.*, 2-3cm., *edge striate*. *N. rufocarnea* B.
Yellowish-green, 2-4cm., *striate*, *papillate*. *N. icterina* Fr.
Yellowish, 2cm., *even*, *viscid*, stem pale *N. subglobosa* A. & S.

10 { Stem fuscous or pallid ochreous 11
Stem and p. blue or bluish-green or -grey 14

11 { Papillate, smoky drying tan, 2cm., *tough*, *hygrophanous* 12
Not papillate nor hygrophanous ; up to 1.5cm. diam. 13

12 { Conico-expanded, gills crowded, white ...*N. infula* Fr.
Convex then *depressed*, but papillate ... *var. versiformis*

13 { Watery-reddish, subumbon , *flocculose* *N. verecunda* Fr.
Pale fuscous, *subumbil.*, *striate*, glabrous *N. minuta* Karst.

REFERENCE LIBRARY, SALFORD, PEEL PARK.

Notes from Periodical Journals.

Zoologist, Dec. 15th, 1911, pp. 441-449.—Once again Mr. Arthur H. Patterson gives us his always interesting notes on Fish from Great Yarmouth for 1911. Only one species was taken which is believed to be hitherto unrecorded for Norfolk, namely, a species of Skate known as the Sandy Ray. Some interesting items as to the contents of the stomachs of freshly caught Codfish are given, the chief foods being Crabs, "brown" and "pink" Shrimps, Sea-mice, and Lugworms and fish which owing to digestive processes could not be named. The largest Codfish taken by an amateur was caught by Mr. Pownell and weighed 20lbs. 15oz. A huge Eel is recorded as measuring 64ins. long, 21½ins. in girth, and weighing 32½lbs. In conclusion mention is made of the Norfolk Seals, which inhabit the sandbanks of The Wash, and which appear to be an exceedingly flourishing colony, numbering about a thousand, and causing, so the fishermen say, great damage to the line fishing industry.

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Field, Dec. 16th, 1911.—Some very sound remarks on the latest Orders made by the Home Secretary on the application of different County Councils. These Orders are so numerous, so confusing, and in many cases so absurd, that the writer feels no good can ever be done until all the existing Orders are swept away and a simple and single Act passed to protect all British Birds between certain dates during the breeding season, with the exception of certain species which, for good reasons, it may not be desirable to protect. In conclusion the writer says, "It would be far easier to name those which require no protection, than to give a list of those which do, and until some such simple Act is substituted for the various statutes and orders now in force, it is hopeless to expect that the law as it at present stands will be understood, respected, and observed." [With this all true naturalists will heartily agree.—F.W.S.]

o o o o

Field, Dec. 16th, p. 1350.—A sketch showing the legs of a cock Pheasant, which were recently sent to the *Field* Laboratory and which show a proliferation of spurs, one leg (the right) having eight and the left leg five. In each case two spurs are well developed on each leg, and the others somewhat small and one or two quite rudimentary.

Field, Dec. 16th, p. 1350.—A note from Mr. Charles C. Tyrrell Giles, of Hopton Thetford, Norfolk, stating he had found a large Heron dead, the cause of death evidently being the attempt on the part of the Heron to swallow a Little Grebe, which latter was, when the Heron was found, with its head and neck down the throat of the Heron and its wings expanded in such a way as to prevent any further progress down the Heron's throat. [Why the Heron could not cough it up again I am unable to guess.—F.W.S.]

o o o o

Field, Dec. 23rd, p. 3078.—A note from Mr. F. Boyes, of Beverly, Yorkshire, stating that a Scandinavian Dipper was shot near Bridlington on or about the 16th inst. [The Scandinavian form differs from our English Dipper in having the belly black instead of white.—F.W S.]

o o o o

Field, Dec. 23rd.—A very interesting note on "Incubation by a cock Partridge": "The following account of a cock Partridge hatching out eggs may interest some of the readers of the *Field*, especially as it comes from a thoroughly reliable source. Our correspondent writes:—'You will perhaps remember my story about the cock Partridge incubating his wife's eggs. I have been asking the keeper who reported it to me about the matter, and his tale is as follows: "A hen Partridge was sitting on dummy eggs (the Eastern system); she was killed by a fox. The day after he discovered she had been killed, he found a cock Partridge sitting on the dummy eggs and this he continued to do for about a week. He wired the nest round with the bird still sitting there. At the end of the said week he put nineteen chipped eggs, which had been sat on by a barndoor hen, under the bird, who hatched them. He saw the covey afterwards, with the single old bird in charge of them."' This is an interesting case, as the cock bird finished the incubation of eggs collected under the Eastern system, and the details of the case being so fully given shows how carefully the observations were made. Cases of wild cock Partridges bringing up the coveys are not unknown, and instances are known of even cock Pheasants incubating the eggs of the female." [I give the above in its entirety because I think, as does the Editor of the *Field*, that the statements are accurate. Some three years ago I came across a pair of Partridge here which had six half-grown barndoor chickens with them; in this case I presume one of my hens had laid away in the Partridge's nest and the latter had hatched and reared the chickens. I saw them about for two or three weeks, but what their ultimate fate was I never knew, we certainly never saw them after September came in.—F.W.S.]

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Field, Dec. 30th, p. 1447.—Note of Swallow picked up dead (death due to starvation) by Mr. Wm. T. Crawshay, Caversham Park, Reading.

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Field, Dec. 30th, p. 1447.—An interesting note of a hybrid between a Pochard and Shel-duck which was hatched and reared at Christ Church Park, Ipswich, in 1910, and another hybrid between a Muscovy Drake and an Egyptian Goose, both birds being still on the ornamental water of the park.

o o o o

Field, Dec. 30th, p. 1447.—Some interesting notes from Mr. H. H. Wardle, Egremont, Cheshire, on birds nesting in December, of which the following records are given: A brood of four young Thrushes, fully fledged, near Stenhills Farm, Runcorn, Cheshire, Dec. 20th. In 1908-09 the following records were noted: Dec. 1st, Sparrow, young newly hatched, Tunbridge Wells; Dec. 11th, Starling, four eggs, Standon; Dec. 12th, Starling, young fledged, Cark-in-Cartmel, Lancashire; Dec. 20th, Robin, three eggs, near Mansfield; Dec. 22nd, Thrush, four young, Sandy Lane, near Devizes; Thrush, two eggs, near Lancaster; Starling, young about to fly, Chester-le-Street; Dec. 24th, Starling, three young fully fledged, Wigton, Cumberland; Robin, three eggs, Brooklands, Cheshire; Dec. 29th, Starling, half-fledged, Stockbridge; Starling, three eggs, Stainmore Fells; Jan. 3rd, 1909, Robin, three eggs, Overton, Hants.; Jan. 5th, Thrush, four eggs, Quarry Bank, Market Drayton; Jan. 10th, Robin, three eggs, Lewes, Sussex; third week in January, Moorhen, young birds, Botley, Hants.

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British Birds, Jan., pp. 210-218.—An interesting review by Dr. N. F. Ticehurst of Dr. L. Burean's recently published book, *L'Age des Perdrix*, which deals with the age and moult of the Common Partridge (*Perdix cinerea*). Dr. Burean, after many years' most careful and painstaking work has been able to tabulate the moult of the Partridge from the shell to the adult plumage, and by the moult and growth of the primary feathers to be able to tell the exact age, *in days*, of a young Partridge,

from the 13th day, at which age the bird first flies, to the 116th day, when the bird has completely assumed its first winter plumage. I would strongly recommend anyone interested in our Partridge, both naturalists and sportsmen, to obtain a copy of *British Birds* for January, 1912, and read Dr. Ticehurst's interesting article, or better still obtain Dr. Burean's book, Vol. I. *L'Age des Perdrix*, which is very fully illustrated, and also touches on the life-history of the bird in question. Vol. II. of *L'Age des Perdrix* dealing with the Red-legged Partridge (*Caccabis rufa*) is understood to be in an advanced state and will be awaited with much interest.

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British Birds, Jan., p. 219.—A new British bird has been added to the British List in the shape of the American form of our Peregrine Falcon (*Falco peregrinus anatum*). Two specimens have been obtained, both of which are stated to belong to the American sub-species by Dr. Hartert. One was shot by Mr. W. Whitaker at Newbold Verdon, near Market Bosworth, Leicestershire, on October 31st, 1891, and exhibited by Mr. E. Bidwell, at the meeting of the British Ornithologists' Club on June 14th, 1911; the other was netted by a man engaged in catching Plover at Humberstone, on the Lincolnshire Coast, on September 28th, 1910, and reported by Mr. G. H. Caton Haigh. An illustration of this latter bird is given, and Dr. E. Hartert, of Tring Museum, writes concerning both, "I have examined both specimens and consider both to be young *Falco peregrinus anatum*. They are too dark for *F. p. peregrinus* and were recognised as something unusual by every observer."

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British Birds, Jan., pp. 222-223.—Some further records of the recovery of marked birds, the most interesting being: A Redshank marked by Miss A. C. Jackson at Cromarty, Firth, East Ross-shire, on July 5th, 1911, as a nestling and recovered at Clew Bay, near Westport, Co. Mayo, Ireland, on Nov. 26th, 1911. A Black-headed Gull marked by H. L. Popham at Scawby, Lincolnshire, on May 29th, 1910, as a nestling, recovered at Denbigh, North Wales, on December 2nd, 1911. A Black-headed Gull marked at Ravenglass, Cumberland, on June 27th, 1910, as a nestling by Messrs. Robinson and Smalley, recovered at Marfleet, Hull, Yorkshire, Dec. 9th, 1911. A Black-headed Gull, marked by Mr. Robinson at Ravenglass, Cumberland, on June 12th, 1911, as a nestling, recovered near Tynemouth, Northumberland, on December

2nd, 1911. A Song Thrush, marked by Mr. T. F. Greenwood at Hebden Bridge, Yorkshire, on May 13th, 1911, as a nestling, recovered at La Clarté, Perros-Guirec, Côtes-du-Nord, France, on Dec. 8th, 1911.

Jan. 4th, 1912. F. W. SMALLEY, M.B.O.U.

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In the *Journal of Conchology* for January appears the excellent address delivered by J. W. Taylor at the annual meeting of the Conchological Society held at Hanley on October 14th, in the absence of the President. This was on the "Biology of the Mollusca," based chiefly upon a study of *Helix aspersa*. The rapid changes taking place in our Fauna and Flora at the present time were referred to, and the distribution of Mollusca, with a special reference to the way in which this species has increased in modern times. The use as food, the internal structure, and the reproductive system are dealt with in Mr. Taylor's usual all-embracing manner.

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In the same Journal appears a plate illustrating *Pseudanodonta rothomagensis* Loc. in Britain by W. H. Foxall and H. Overton. "*Testacella* in Staffordshire" is contributed by John R. B. Masefield; and H. Overton deals with "On the occurrence of *Clausilia dubia* Drap. in Kent."

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At the exhibits in connection with the Society there have been many of interest to our readers. At the September meeting Mr. J. Davy Dean showed *Hygromia rufescens*, peculiarly distorted, from Warton Crag; Mr. J. W. Baldwin, a fine series of marine shells from Southport, collected during July of 1911. At the annual meeting in October Mr. C. H. Moore had a series of *Helix aspersa* from various localities; Mr. R. Standen, a fine series of non-marine shells, cut to show internal structure, prepared by himself for the Manchester Museum collection; *Aporrhais pespelicani* from Southport, showing growth stages from embryo to adult; Mr. J. Wilfrid Jackson, *Pleuronautilus pulcher*, from the Lower Coal Measures of Stalybridge (horizon: over first coal); *Glyphioceras aff. reticulato*, from the Lower Coal Measures of Bacup (horizon: Upper Foot Mine).

At the meeting on November 8th, Mr. J. Ray Hardy exhibited a remarkable form of *Helicigona arbustorum*—approximating in colour to the var. *castanea* of *Helix nemoralis*—collected early in the month in Prestwich Clough, Manchester. "It is interesting to find this species existing so near the city, as the larger *Helices* have practically been killed off for a considerable distance round by the increase in thrushes and the poisoning of the herbage by smoky rain." He also showed a fine series of *Helicella virgata* of large size and great variety of marking, taken at Cleveleys near Blackpool, at the end of September last; the species has considerably extended its range along the coast between Blackpool and Fleetwood, since it was first observed near Rossall about thirty years ago, and the specimens are now fully treble the size they were then, and show far greater variation. Mr. Harry Allen: A series of *Clausilia bidentata* var. *cravenensis* from Ilkley and Cark, showing difference in form from each locality. Mr. R. Standen showed the series of British oysters from Whitstable recently presented to the Manchester Museum; Mr. Fred Taylor, *Hyalinia lucida* from Oldham Park Conservatory; Mr. J. Wilfrid Jackson: Large examples of *Nautilus pompilius* (diameter 8½ins.), *Conus prometheus* (length 7ins.), and *Melo æthiopica* (length 11½ins.), from the shell collections at the Salford Borough Museum. Mr. G. C. Spence mentioned that he had seen and examined an example of the latter species at Accrington Museum, which measured over 16 inches in length.

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In the *Naturalist* for January there is an interesting note of the discovery by Mr. J. Ray Hardy of a rare parasitic Hymenopteron, *Choreia inepta* Dalm., "in old nests of sea-gulls at Pilling Moss." We must confess to a feeling of surprise, at first, that this record, so peculiarly appropriate to these pages, should have been sent elsewhere, but we have since received a full explanation of the circumstances, which is wholly satisfactory. We should like, however, to point out that the locality given must be erroneous. The gulls abandoned their ancient breeding station at Pilling Moss, owing to the encroachments of cultivation, in 1876, and migrated in a body to Cockerham Moss, two miles away, where they have ever since been rigorously protected by the late Col. Bird and those succeeding him.

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In the *Stonyhurst Magazine* for December there is a delightful memoir of Mr. T. Altham by Fr. Gerard.

SCIENTIFIC EXHIBITION AT PRESTON.

In the third week of December a very interesting exhibition took place in connection with the Preston Scientific Society at their own rooms. This represented the astronomical, physical, and microscopical side of the work, and included various scientific instruments and apparatus, ancient and modern. In connection with the Microscopical Section, there were a number of instruments showing very interesting slides. Mr. J. J. Bramwell displayed a solar microscope, a century old microscope, and the dipleidoscope to which we have previously referred. A Watt meter was shown working in conjunction with various electric lamps to show their relative values.

Mr. R. F. Hind had on view some enlarged photographs of the moon, and Mr. G. J. Gibbs exhibited a new micro-barometer invented by himself. This is affected by the slightest changes in atmospheric pressure, and even the opening and closing of a door of a comparatively large room is sufficient to cause a movement of the index. Some autographic records of storms taken by the aid of this instrument were on view. An electric lamp lent by Dr. Taylor, used for the examination of the frontal and other bones surrounding the cavities of the eyes, was shown.

A collection of old nautical instruments included a backstaff, dated about 1600, an octant, dated about 1750, a sextant, a Gunter's quadrant, and a nocturnal or star dial. A working model power hammer was lent by Messrs. Peter Pilkington, Ltd., Bamber Bridge, and a series of instruments of precision was exhibited by Mr. H. Tattersall. These comprised a surveyor's aneroid, a prismatic compass, an anemometer, a theodolite, and model verniers, made by Mr. Bradshaw, to explain the construction and use of various classes of verniers as applied to different instruments.

There was an ancient cross sundial and universal ring sundial lent by Mr. T. Harrison Myres; a spectroscope from the Preston Observatory; and a working model to illustrate the meaning of sidereal time, solar time, and right ascension. Some old books of considerable interest attracted attention, one dated 1772 and entitled "An Introduction to Sir Isaac Newton's Philosophy," and another "Practical Astronomy, Navigation, Nautical Astronomy, and Meteorology." Other exhibits comprised optical apparatus and mechanical specimens. These were exhibited by Mr. T. C. Chandler, and some wireless telegraphic apparatus was displayed by Mr. J. H. Morris. A social was held at the close of the exhibition.

CAVE EXPLORATION IN LANCASHIRE.

A further report on the explorations at Dog Holes, Warton, has just been issued with the Transactions of the Lancashire and Cheshire Antiquarian Society. In this J. Wilfrid Jackson, F.G.S., deals extensively with the operations carried on in 1911 at Dog Holes, facilitated by the interest taken in the work by this Society and by the generosity of Messrs. B. R. Lucas, F.G.S., T. H. Platt, J. Rawlinson Ford, F.S.A., and Professor T. M'Kenny Hughes, of Cambridge. At Dog Holes the investigations were mainly devoted to the accumulation at the foot of the shaft, in order to ascertain the lateral extension of the charcoal layer met with previously. In a re-examination of the earth from the bone chamber, deposited in one corner, was discovered a small sharpened bone awl, made from the metatarsal of a sheep. The chief finds in the cave were several fragments of pottery, one of Samian ware ascribed to the first century, others of "Late-Celtic" wares. A hammer-stone, met with in excavating in the swirl hole. Fragments of flint and a flake of black chert were found in practical association with bronze and iron objects near the foot of the shaft. These bronze objects comprised a pair of beautifully patinated bronze scale pans and beam, and a blue and red enamelled bronze pendant. The iron objects included a curved iron blade with open socket for the shaft; two broken iron nails of the usual Roman pattern; and what is suggested to be the tang and part of the blade of a Roman knife. A few human remains were discovered, and of animal remains were met with several large canine remains belonging possibly to wolf, further remains of dog of the type met with in the previous excavations; remains of fox, Celtic shorthorn, sheep, goat, red deer, fallow deer, and roebuck.

Although operations had to be temporarily suspended in September owing to lack of funds, opportunity was taken to make trial diggings at Badger Hole and Fairy Hole, the former a small cave of the "rock shelter" type situated on Barrow Scout about three hundred yards south-west of Dog Holes. Here many animal remains were found, including those of the badger, cat, pine-marten, pig, sheep, fox, rabbit, ox, and of several birds. Numerous land shells were met with, and also marine shells, and also a knife handle of bone, with an implement made from the snag or tine of a red deer antler. Further progress in this cave was eventually barred by a mass of stalagmite, and the work is left for a more favourable time.

The exploitation of Fairy Hole, a small cave situated on the eastern side of Warton Crag, and of a similar character to Dog Holes, resulted in nothing more definite than the discovery of animal remains of a similar nature to the commoner kinds taken from Dog Holes, together with fragmentary human remains. There were also flint flakes, calcite crystals, a fragment of hæmatite, an iron pin or needle (much oxidised), and a few fragments of pottery. Mr. Jackson remarks: "Although the evidence from this cave is rather fragmentary, yet what evidence there is appears to point to the cave having been occupied, like its neighbour Dog Holes, by some Romanised Briton during an early period of the Roman domination."

Interesting particulars are added as to the derivation of the names of the caves and in respect to the traditions associated with the places.

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At a meeting of the Mounting Section of the Manchester Microscopical Society, a demonstration was given by Mr. R. Pettigrew of the various methods of mounting crystals and showing them under polarised light, illustrating the formation of crystals as well as the effects of different circumstances affecting them. He believed that abundant material was easily accessible, it being unnecessary to seek rare substances in order to obtain characteristic and effective slides. Several experiments were made, and the demonstration was illustrated with many specimens, and various substances were distributed.

Mr. A. P. Bradshaw showed his method of mounting marine algæ in glycerine jelly, demonstrating with the common pink seaweed *Plocamium coccineum*, how to cleanse the specimen and render the mount permanently tight by hardening the glycerine jelly at the edge of the cover glass with formalin. Several slides were shown, some of which were leaky and contained unsightly air-bubbles, while others mounted by Mr. Bradshaw nine years previously showed no signs of leakage.

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From the annual report of the Museums, Libraries, and Parks Committee of the Salford Corporation, there would appear to have been a remarkable falling off in the attendances at the institutions under their charge. In the year ended October 31st, 61,941 persons visited the Peel Park Museum and Art Galleries, and 81,246 the Natural History Museum at Buile Hill Park, a total of 143,187, as against 176,148 in the preceding twelve months.

WINTER WORK IN THE RIBBLE ESTUARY.

By J. A. Wheldon, F.L.S.

A small party of members of the South Lancashire Flora Committee visited the district around Hoole and Longton in Christmas week, viz., the writer, Mr. W. G. Travis, and Mr. H. J. Wheldon. The localities more especially examined were the fields and lanes lying to the landward side of the great Longton salt marsh, and the inland borders of the marsh itself. Of course but little could be accomplished in the Phanerogamic Flora of the district. The marsh is much grass-grown, and a considerable number of cattle are grazed upon it, so that to a great extent it exhibits a transition from pure salt marsh to ordinary pasture land. It is much intersected by deep muddy ditches, lined with Cochlearia, Aster, and other mud-loving halophytes. The few mosses seen were of quite ordinary types of universal distribution The chief harvest for the botanist was amongst the Fungi, of which the following species were observed :—

Paneolus campanulatus Fr.
Collybia velutipes Fr.
Russula fragilis Fr.
Lactarius rufus Fr.
Tubaria furfuracea Fr.
Polystictus versicolor Fr.
Radulum orbiculare Fr.
Peniophora gigantea Cke.
Coniophora arida Cke.
Thelephora sebacea Pers.
Corticium sambuci Fr.
Stereum hirsutum Fr.
St. purpureum Pers.
Sphærobolus stellatus (Tode) Pers.
Dacromyces deliquescens Duby.
Nectria cinnabarina Fr.
N. episphœria on *Diatrype*
Melanomma pulvis-pyrius Fck.
Diatrype stigma Fr.
Xylaria hypoxylon Grev.
Gnomonia rostellata Fr.
(On rose stems).
Leptosphœria acuta Karst.
(= *Heptameria acuta* Cooke.).
On *Urtica dioica.*
Ophiobolus porphyrogonus Cacc.
(= *Raphidospora rubella* Fck.).
Mollisia cinerea Karst.
M. atrocinerea Phil.
Ascophorus equinus Mass.
Botrytis cinerea var.
Scleriotrophila Sacc.
Stilbum erythrocephalum Ditm.
(On bird's dung on a post.)

Amongst the flotsam cast up by the flood-tide on the marsh was an old turnip, which was covered with a broad orange layer of *Fusarium Cordæ* Mass. (= *F. aurantiacum* Corda).

A few Lichens were observed, chiefly on old posts and the coping stones of bridges. Amongst them were *Physcia parietina* (fruit), *Physcia pityrea* (sterile), *Parmelia saxatilis* (sterile), *Lecanora varia* and *L. galactina* (both fruiting). This may be regarded as a very favourable list for a district which is peculiarly unsuited for these plants.

REMINISCENCES OF THE LATE MR. ROBERT CAIRNS.

By R. Standen.

By the death of Mr. Robert Cairns, which took place from heart failure, at his residence at Hurst, on Friday, December 29th, 1911, a well-known figure, and a strong personality, has disappeared from the ranks of Lancashire naturalists. For some time past disquieting rumours of failing health have from time to time caused his friends grave anxiety, but those who saw him but occasionally were deceived by his robust and healthful appearance, and his cheerful optimism, into believing that nothing was very seriously the matter with him. The sad news of his death, therefore, at the comparatively early age of 57, came as a profound shock to many. My own deep sense of personal loss will, I feel sure, be fully shared by his numerous naturalist friends, and the sympathies of all will go out to his bereaved wife and family. My first intimation that something was radically wrong came from himself, at the last meeting of the Conchological Society he ever attended. We were going upstairs together to our meeting room in the Museum, and on reaching the top he stopped suddenly, and abruptly asked, "When are the Museum authorities going to provide a lift for invalids?" I laughingly replied that I was afraid it would be a long time before they fixed up a "lift" for such a robust-looking individual as he. He shook his head, and said, "It does not always do to trust to appearances; I m all wrong here"—indicating his heart. On my expressing concern he laughed it off, and during the meeting was just his old breezy self. Certainly, no one present at that meeting thought for a moment that it was the last time we should see him amongst us.

Mr. Cairns came to Ashton from Hawick, Roxborough, in 1875, or thereabouts, and for several years acted as assistant to Mr. Abraham Park, J.P., at the Albion Schools. This position he relinquished to take over the headmastership of the Hurst Undenominational (Old British) School, which he has held for the past 35 years.

Mr. Cairns was a man of extensive reading and wide culture, with a deep love for natural history pursuits. Above all he was a "Field Naturalist," in the truest sense of the term. In his younger days he was devoted to Botany, and also formed a good collection of birds' eggs. Later he became an enthusiastic Geologist, and Conchologist, and it is by his knowledge of these two subjects that he has made for himself a

name which will long be revered by the local naturalists with whom he was brought into contact. Strangers, on a first introduction, were sometimes disposed to take umbrage at his strongly expressed opinions, but on further acquaintance never failed to recognise and appreciate the innate kindliness of heart underlying his somewhat imperious manner. Those who knew him best readily forgave him, when he, metaphorically, "trod upon their corns" rather roughly, for he was rarely wrong in his conclusions. He thoroughly enjoyed a good joke or story, and had a considerable *repertoiré* of such, which he could relate in an inimitably semi-serious style, his explosive laugh at the end never failing to "bring down the house." He was a regular attender of the various naturalists' rambles, and was always a welcome addition to the party. Many a pleasant outing has been rendered doubly delightful by his cheery presence. He was an energetic and successful collector in the field, and it is a matter for regret that he could never be persuaded to write anything about his varied experiences, or the objects collected, for which his wide and practical knowledge of his subjects eminently fitted him. But he was ever ready to place his knowledge at the disposal of any of his compatriots, and extremely generous in the distribution of his duplicate specimens, especially to beginners.

He was for many years a member of the Manchester Microscopical Society, and although not an actual working microscopist took a very keen interest in its proceedings. He was also a member of the Malacological Society of London, and the Conchological Society of Great Britain and Ireland. Although, I believe, not an actual member, he seems to have taken considerable interest in the Oldham Natural History and Microscopical Society, since I note in their proceedings that he frequently exhibited shells at their meetings. He took part in many of the joint rambles of this Society and the Manchester Microscopical Society.

For many years he assiduously collected fossils from the numerous coalpits lying between Ashton and Oldham, and formed an extensive and valuable collection of fish and other remains, amongst them being a number of specimens of Palæoxyris—a problematic fossil referred by some authorities to a fruit and by others to egg-cases of sharks. Several of Mr. Cairns' examples from Chamber Pits, Fitton Hill, were described, and one of them figured, by Mr. J. Wilfrid Jackson in this Journal for January, 1911. During the sinking operations of the Ashton Moss Pit, at Audenshaw, an excellent opportunity

was afforded of collecting and studying the various fossil remains met with, and Mr. Cairns by his unwearied labour got together a fine series of interesting specimens which he afterwards presented to the Manchester Museum. In many of his excursions to this pit he was joined by two of his old friends, Messrs. W. Moss and J. H. Grundy, both of whom were keen geologists. Mr. Cairns also collected extensively from the celebrated "marine band" in the Middle Coal Measures exposed on the banks of the R. Tame at Dukinfield, one of the many forms of Mollusca from this horizon being named in his honour, viz., *Aviculopecten cairnsii* Bolton.

One of his favourite collecting grounds further afield was the Mountain Limestone area around Castleton, Derbyshire, where he spent many happy hours breaking out fossils from the rich beds on Tray Cliff near the celebrated Winnats Pass. Here he was particularly fortunate in finding many interesting forms, including Trilobites and the spines of the ancient Cidaris; while in a quarry close to Sparrowpit, some few miles away, he discovered large numbers of the curious palatal teeth of fossil sharks.

Another equally favourite collecting ground was the Limestone area of Clitheroe, which he often visited, the chief attraction to him being the abundance of the Encrinite heads there obtainable. He often used to relate an annoying experience he had on one of these visits, which was not without its humorous side. He had spent a long hot summer's day in a newly opened quarry, obtaining many good things, including a number of the finest and most perfect Encrinite heads he ever saw, with which he had filled his handbag and pockets to their utmost capacity. On arriving, tired and dusty, at the station in good time for his train home, he placed his bag—which would weigh anything between 20 and 30 pounds—on one of the seats, whilst he went to the ticket office to make some enquiry. Although only absent for a few minutes, when he returned the bag had vanished! In narrating this episode he used to say, that he could have felt quite reconciled to the loss of his treasures, if only he could have seen the face, and heard the remarks of the thief, when, after probably carrying that bag to a long distance, until a quiet corner was reached, it was opened and found to contain only stones!

When he began to seriously take up Conchology, he very generously handed over, *en bloc*, his large collection of

geological specimens to the Manchester Museum. This acquisition, which included fossils from nearly every formation, was gratefully accepted by the Museum authorities as a very welcome addition.

Mr. Cairns joined the Conchological Society in 1891—but had long prior to that interested himself in the Land and Freshwater Shells of the Ashton district and elsewhere. He soon became one of the most enthusiastic members of the Society, taking great interest in the meetings, which he attended as often as his heavy scholastic duties would allow, and rarely missed an excursion. His collections of British Mollusca eventually became very fine and complete. He also collected exotic Mollusca, exchanging specimens with many of the principal Conchologists of this and other countries. The exigencies of space ultimately led to his specialising in certain favourite groups. Chief amongst these may be mentioned the Land Shells of South Africa, Japan, Philippines, and Sandwich Islands. He had also an extensive collection of the operculated Land Shells of the world. In foreign Marine Shells he was more particularly interested in the *Marginellæ*, and the Mollusca of the Loyalty Islands. But his favourite group of shells were the Cypræas, or Cowries, and of this beautiful and attractive family he possessed a very large and comprehensive series, extremely rich in many rare species, and numerous examples illustrating peculiarities of local variation due to the influence of environmental conditions—a subject which he studied keenly. Nothing pleased Mr. Cairns better than a good discussion on some knotty point connected with the *Cypræidæ*, and his shrewd remarks on the subject, when some of these shells were exhibited at a Conchological meeting, have more than once considerably enlivened the proceedings. His knowledge of the group was very thorough, and as the Cypræas are also one of my own special groups, they often formed a principal topic when we met at each other's houses, or at the Museum, which he frequently visited at leisure moments. I well remember one Saturday afternoon in particular, when he and our mutual friend, the late Mr. Thomas Rogers, were at my house. I was showing them my Cypræas, and we soon became involved in a good, whole-hearted "Threeap," such as they both loved. So vehement did our discussion become that my wife came into the room, and said, "Well! if I didn't know who was here, I should have thought you were a lot of noisy schoolboys playing

Yours Sincerely,
Robt. Cairns.

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marbles"—a remark which greatly amused them. Mr. Cairns and I often, in the after time, sadly alluded to this memorable afternoon—memorable, because it was fated to be the last "Threeap" we were ever to have with our dear old friend. For Mr. Rogers started on the following Monday with a party of friends for a ramble through the Lake District, and met with a tragic death a few days later, on the slopes of Helvellyn, and now lies in the quiet churchyard of Patterdale.

One of Mr. Cairns' most prized possessions was some specimens of the "historic" original examples of *Planorbis dilatatus* Gould, first discovered in this country by Mr. Thos. Rogers in the Bolton Canal at Pendleton, in June, 1869, in close proximity to the blowing room refuse and warm water discharge from the engines of Messrs. Armitage's cotton mill. This shell, which is believed to have been introduced with American cotton during the civil war, has since become acclimatised in the canals around Manchester, particularly where they are warmed by the hot water from the mills.

The following shells have been named in honour of Mr. Cairns :—

Haminea cairnsiana Melvill and Standen.
Ennea cairnsi Melvill and Ponsonby.
Cypræa caurica var. *cairnsiana* Melvill and Standen.

Mr. Cairns was buried on New Year's Day, in the Cemetery at Hurst, the funeral being attended by a large gathering of personal friends, and representatives of the various institutions, natural history and other Societies, with which he had been connected. A great concourse of his scholars and neighbours had also congregated to pay a last token of respect to one they knew so well. Many of those present on this sad occasion will long remember, and connect with it, the phenomenally spring-like aspect of the day on which we laid our friend to rest—the while, blending with the solemn words of the burial service, the tuneful notes of a Thrush in an adjacent tree appropriately served as a "Naturalist's Requiem."

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Mr. F. H. Day, of Carlisle, records in *The Entomologist* a number of new beetles from Cumberland, including *Oxypoda soror* Th., which he found crawling on short grass on the summit of Saddleback. He states that this is probably new to the North of England.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Aplozia rivularis Schiffner in Staffordshire.

In examining a collection of Hepaticæ made in August this year (1911) in the Dane Valley, I find the above species. I collected it on the Staffordshire side of the river, on wet shaly rocks, with perianths and the antheridia in bracts below the same; the paroicous inflorescence being the chief character distinguishing it from small forms of *Aplozia riparia* (Tayl.). All the small forms of *Aplozia riparia* (Tayl.) from limestone districts which I have examined are dioicous.

I am sending specimens of this species, also specimens collected at Woodhead, Derbyshire; *Lejeunea serpyllifolia* (Dicks.) from Mottram, Derbyshire; *Aplozia sphærocarpa* (Hook.) var. *lurida* (Dum.) from Westmorland; *Lophozia Muelleri* (Nees) from Staffordshire, and *Sphenolobus exsectiformis* (Breidl.) from Alderley Edge, Cheshire, which I have recorded in the *Lancashire Naturalist*, to the Manchester Museum.

WM. HY. PEARSON.

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Spider v. Wasp.

In late August, when *Vespa sylvestris* was exceedingly troublesome indoors, a great many were found in odd corners which had fallen victims to spiders. Much as I desired to be an eye-witness to one of these encounters, I was never granted that privilege. I endeavoured to obtain a view by supplying the victims myself. I carefully placed active members of the species on selected webs and calmly awaited results. There was at first a hurried rush on the part of the spider, with a sudden stop on discovering the nature of the invasion. Then the spider went back into cover. Once or twice the spider ventured to peep out as the wasp relaxed its frantic efforts to free itself, but finally went into cover for good. In all cases the wasps succeeded in breaking clear of the webs without being seriously challenged.

Garstang. J. R.

Interesting Reminiscences.

In looking over some old records, I was much surprised at the number of joint excursions that used formerly to take place in Lancashire. Mr. Wigglesworth refers in the Jubilee Souvenir of the Accrington Naturalists' and Antiquarian Society to one held at Whalley during the first year that the Manchester to Accrington Railway was opened of Societies from Manchester, Middleton, Bury, and Accrington. This took place on the first Sunday in June, and after meeting at Accrington Station the party proceeded to Cock Bridge, where three sections were formed. One section visited Read and Sabden over the Nick of Pendle, returning to Whalley via Pendleton. Another section visited the banks of the Calder. A third section took the highway to Whalley. The sections were led respectively by Mr. Andrew Pollard, of Great Harwood; Mr. Buxton, of Manchester; and Mr. Horsfield, of Whitefield.

It must be getting well on to forty years since I took part in an excursion embracing Warmden Quarry and Hambledon Hill. I believe it was on the invitation of Mr. Abraham Ashworth, then steward of the Hargreaves estates, that this privilege was extended to us. The late Mr. John Rhodes, of Accrington, was of the party, and at that period was very enthusiastic in geological matters. On the hillside there arose a keen discussion on glacial action, and Mr. Rhodes was very emphatic in his contention that not only Hambledon Hill but some of the smaller ravines exhibited traces of this influence.

On one of the old highways close by that led to Clitheroe from Haslingden a fault in the rock was inspected, and at one point pieces of Peterhead Granite and Silurian Grit gave additional material for the renewal of the arguments as to the glacial age and its action upon the local hills and valleys. In one of these streams excavations were at one time conducted by Dr. Kennedy Gill and Mr. Thomas Lightfoot, and evidences of an ancient bloomery were discovered. Dr. Kerr, of Crawshawbooth, subsequently joined in these investigations, and wrote up an interesting account of these places.

We were joined by members of the Crawshawbooth Geological Society, and afterwards made our way to Accrington, where at the Hargreaves Arms Hotel we were royally entertained by Mr. Abraham Ashworth, who presided, and was supported in the vice-chair by Mr. Spencer, F.G.S., of Rossendale. In responding to a toast, Mr. Ashworth said he was happy to encourage young men to pursue any branch of scientific

education. Mr John Rhodes proposed the toast "Success to the Crawshawbooth Literary Club," with which was associated the Geological Club, and to this Mr. Spencer responded. Dr. Kerr and Messrs. T. Hargreaves, Holmes Greenwood, and Whitehead also spoke.

The sandstone obtained from Warmden Quarry was at one time much used in the paving of the Accrington streets, but it was costly to work, being much stained with iron, and freely mixed with boulders. As in the old days most quarries were opened out for local purposes, it would be of interest to know how the various stones were applied.

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In the January *Journal of Botany* Mr. G. S. Boulger, F.L.S., has the first portion of a lengthy and detailed biography of the late "Sir Joseph Dalton Hooker," and Mr. W. R. Grove continues a valuable addition to his series of notes on "New or Noteworthy Fungi," which are accompanied by descriptions of the species quoted. There is also an interesting article on "The Shepherd's Purse and Cultivation" by E. A. Woodruffe-Peacock, F.L.S., in which observations on the growth and forms of this plant are presented in quite a discursive manner.

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The *New Phytologist* for November and December, 1911, contains further notes by Mr. Druce on the International Phytogeographical Excursion, and the descriptions of new varieties found on this occasion will be welcome to British botanists. The floristic results are tabulated, but it is difficult to understand why many of the species are included, as they are old records of fifty years standing or more The really new discoveries would have been more accessible had such well-authenticated items of the list been omitted. *Arabis hirsuta*, *Potentilla verna*, *Alchemilla filicaulis*, etc., are so well-known as Silverdale plants, that their inclusion in the list of "floristic results" seems to be almost unnecessary. By the way, all the Silverdale records are quoted as from V.C. 69, including the station for *Atropa Belladonna*, which is unquestionably in Vice-County 60, where it has been well-known to occur abundantly since 1775.

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The photograph of Mr. Cairns is by J. H. Platt, of Ashton-under-Lyne.

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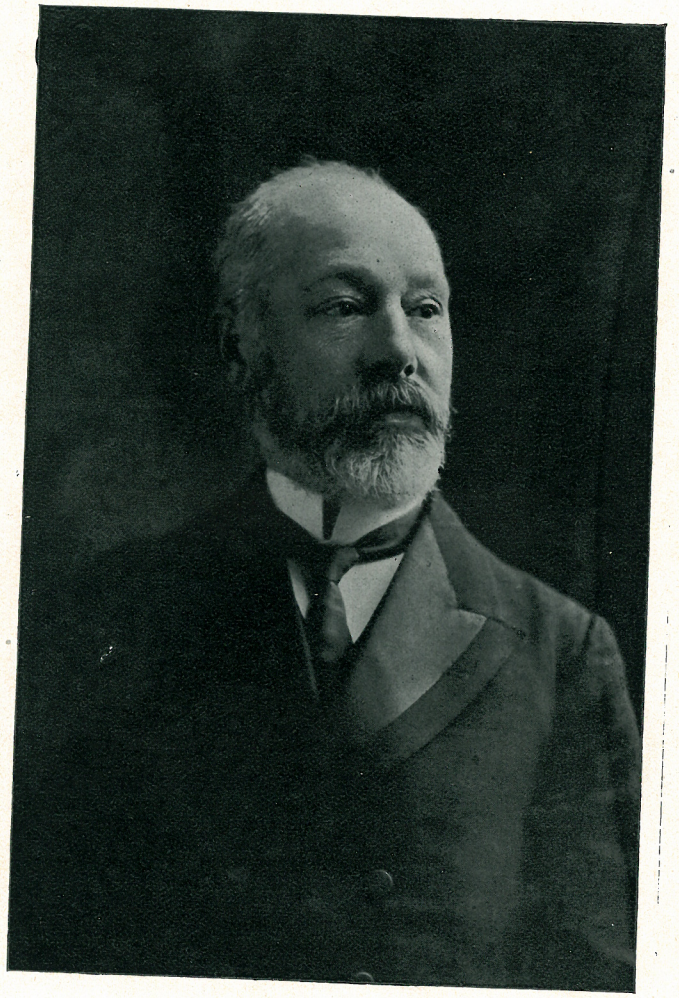

DR J. W. ELLIS, F.E.S.

The Passing Hour.

By the death of Mr. Samuel James Capper, F.E.S., of Huyton Park, Liverpool, a well-known figure in Entomological circles, particularly in Lancashire and Cheshire, has been removed from our midst. Indeed he was the founder of the Lancashire and Cheshire Entomological Society, the first meeting being held at his residence on the 26th March, 1877. He was in his 87th year, having been born in London on the 28th April, 1825. An early love for entomology was fanned into activity by contact with the two brothers Doubleday, whom he met at a boarding school at Epping. An amusing incident appears in a sketch dealing with Mr. Capper in the *British Naturalist* for March, 1892, from the pen of the Editor, John E. Robson, who knew Mr. Capper very well. "He [Mr. Capper] remembers being present at a Friends' meeting, when a specimen of *Catocala nupta* dashed about the room for a time, then flew to one of the windows, when Henry Doubleday quietly left his seat and captured the prize to the great amusement of the congregation."

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Business occupied Mr. Capper's time to a considerable extent after he left school, and it was not until he made the acquaintance of the late Benjamin Cooke on settling down in Liverpool that his old love for Lepidoptera reasserted itself. The latter was an indefatigable and enthusiastic collector, and he soon persuaded Mr. Capper to take up active collecting again. About 1874 an incident occurred that was destined to have an important influence on his natural history work. It was while collecting on the top of Penmaenmawr that he had an accident the results of which lingered with him through life, and prevented his active participation in field work. Probably this, too, had some connection with the zealous manner in which he worked for the formation of the Lancashire and Cheshire Entomological Society.

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Mr. Capper was its first President, and for a long sequence of years he occupied the Presidential chair. His addresses were always full of interest. He has never written much, and is best known by his collection, which after the acquirement of Mr. Sidney Webb's collection from Dover was one of the finest to be seen anywhere. Even prior to this purchase it was one replete with a large number of interesting and valuable varieties. He also possessed a collection comprising type

specimens of all orders of insects, with examples showing their early stages. He spared no pains at any time to secure varieties and conspicuous specimens, and with these his cabinets were replete. His collections were always open to the entomologist, either for study or for comparison, and previous to the disposal some time ago were extensively used for these purposes by entomologists.

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There passed away on December 20th, at his house in Smithy Bridge Road, Littleborough, a well-known Lancashire ornithologist in the person of Mr. John Stott. By careful study and observation of their habits, Mr. Stott had gained a wide knowledge of bird life. He was regarded locally as an authority on the subject of birds, and was often approached on questions concerning this branch of natural history. He had been a member of the Rochdale Literary and Scientific Society since 1896. Before this Society he read in 1899 a paper on "The Birds around Hollingworth Lake." This contained a valuable list of the birds to be found locally, being afterwards printed, and has been much quoted, Mr. F. J. Stubbs making reference to it in the paper on "The Birds of Oldham" that concluded in the early part of this volume of the "*Lancashire Naturalist.*"

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Mr. Stott was 64 years of age, and for over half a century had been in the service of Messrs. Hall and Rogers, sanitary tube makers, thirty years of this period acting as commercial traveller for them. He was a very well-known figure in the old woollen market that is still held on a smaller scale in Lord-street, Rochdale, and will be remembered by the older merchants and dealers of the town who frequented the "exchange." He was passionately fond of the moors, and often conducted parties of ramblers who desired to know the beauties of the hills.

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Mr. G. J. Gibbs, of the Preston Scientific Society, has been elected a Fellow of the Royal Astronomical Society. Since his connection with the Preston Corporation Observatory, Mr. Gibbs has brought the instruments to a high state of efficiency, and has invented and adapted several little contrivances for the more perfect working. He is an enthusiastic scientist, and has done much to help in popularising the study of astronomy in Preston and the surrounding districts.

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PIGMY FLINT IMPLEMENTS: THEIR PROVENANCE AND USE.

On February 1st, a Congress was held at the Manchester University under the auspices of the Lancashire and Cheshire Antiquarian Society. The subject under discussion was "Pigmy Flint Implements: Their Provenance and Use." A fine series of Pigmy flint implements from all parts of the world were on view in the Manchester Museum, and remained there during the week following. Along with the Pigmy flint implements especially from the Rochdale and Scunthorpe Floors, were placed the co-related implements such as arrow-heads, flaying knives, skin-scrapers, and skin cutting tools. The following fine series of Pigmy flint implements were also exhibited:—

(1.) From the Vindhya Hills, India.
(2.) Lakenheath, Cambridgeshire.
(3.) Horsham, Sussex.
(4.) Helouan, Egypt.
(5.) Yorkshire Barrows.
(6.) Isle of Man.
(7.) Dorset.
(8.) Isle of Aran (Ireland).

The whole series made a really magnificent collection, and probably such an exhibition will never be got together again.

After a few opening remarks by the President of the Society, Mr. Albert Nicholson, Mr. W. H. Sutcliffe, F.G.S., read a paper dealing with the subject. In introducing this Mr. Sutcliffe referred to the fact that Messrs. Law and Horsfall were the first to recognise Pigmy flint implements in England, and commencing a series of investigations, on the Rochdale Floor, in 1879, they visited the highest summits and most prominent hills within a radius of twelve miles from Rochdale. In 1882 they prepared a paper dealing with the results of their labours, which was published in the *Proceedings of the Yorkshire Geological and Polytechnic Society*, in 1882. From this paper it appeared that their chief work was done on March Hill, a conical eminence overlooking the vale of Marsden. Here more than two thousand flints were found on a few small patches of bare ground, on its southern side. The flints varied in size from chippings not larger than a pin's head to flakes two inches long. Several small flint cores and one leaf-shaped arrow tip with a broken point were also picked up. The paper goes on to show the gathering of flints on succeeding visits, and in digging at

several places the following section was exposed : 1. Peat from ten to sixteen inches thick. 2. Dark Peaty-clay, from two to six inches thick. Dark-grey Sand, with angular pieces of sandstone, all local, six inches thick ; flints occurred abundantly in this layer. 4. Red Ochreous sand, about twelve inches thick, resting on Yoredale shale. The true position of the flints was the dark-grey sand, in which they occurred at all levels ; it yielded from twelve to a hundred and twenty flints per square yard. Not a particle of flint was found in the other layers. Messrs. Law and Horsfall were convinced in their own minds that all the associated flints had a common origin and must have been fabricated by prehistoric man. In this they had the concurrence of Mr. John Evans, F.R.S., who examined a number of their flint implements, and who also instituted a comparison between them and flints found in Egypt and other places abroad. Mr. Evans believed they might have been used as carving tools, but there was not sufficient evidence to determine whether they belonged to the Neolithic or Bronze Age.

Having by the recital of these facts prepared the way for a record of more recent work, Mr. Sutcliffe proceeded : "Twenty-five years ago, and on several occasions since, up to quite recently, Mr. Parker and myself have visited March Hill, and every time have collected a fresh crop of pigmy implements and minute chippings. Six months ago, we were accompanied by Professor Boyd-Dawkins and the Rev. Reginald A. Gatty, when we picked up a large number of small chippings, and several Pigmy implements, but no arrow-heads, no scrapers, and no large flakes. Of course, small flint implements are more likely to travel down in the soil than to rise in it On December 31st, 1911, we paid another visit, with very similar results." Here the careful work, close observation, and clear reasoning of the two early practical pioneers was referred to, and it was mentioned that Dr. H. Colley March, then of Rochdale, who was making investigations at the same time as Messrs. Law and Horsfall, and who read a paper on the subject in 1881 to the Rochdale Literary and Scientific Society, arrived at the following conclusion :—"That the hammer-stones, cores, flakes, scrapers, arrow-tips, spear-tips, all of a small size, as well as minute implements such as awls, gravers, perhaps tatooing instruments, and, possibly, fish-throttles, belong to an early race, and that leaf-shaped and barbed arrow-heads were the weapons of a later people, by whom the remnant of the earlier race was, perhaps, at last exterminated."

Mr. Sutcliffe proceeded : "In support of Dr. March's theory, I must here state that I myself have found a few barbed arrow-heads on the top of the peat, and all the other implements I have found have been under the peat. Mr. Parker has never found barbed arrow-heads on the top of the peat, and is of opinion that those I found were blown there by the wind.

"The hills surrounding Rochdale, on which the Neolithic race lived, are cold, bleak, wind-swept spots. We visited March Hill on December 31st, 1911, a high wind was blowing, and it was terribly cold. After half-an-hour's work we were like ravenous wolves, and we felt the necessity for extra clothing. The climate in the Neolithic Age would be very similar to what it is to-day, and these Neolithic men, being human, would feel cold and hunger as we did. Now, let us tackle this problem like practical men, and, therefore, look at it from a utilitarian point of view. Intense cold, and great hunger, are the two main points in question, therefore animal food and warm clothing would be essential to maintain life. How were these supplied, and what animals lived in this far off past? Mr. Gatty found the inner core of a horn of *Bos longifrons* on March Hill, and we found the tooth of a horse in the Hades Hill barrow. In addition to these, goats, sheep, and birds of many varieties would furnish food and clothing ; while wolf, dog, fox, stoat, weasel, badger, and vole, would supply skins (for this early race lived in an age before weaving was invented, and, therefore, must have clothed themselves in skins).

"Flint was, in ancient days, as great and dominant a thing in human life, as iron and steel are to-day, and we have found the following implements, all made of flint : the arrow-heads with which this early race killed the animals so essential to existence ; we have found their flaying knives, by which they removed the skin from the carcase ; we have found their scrapers, by which they removed the fat and hair from the hide ; we have found the knives, by which they shaped the skins for garments. All these implements are large in size ; now, let us look at the smaller ones, taking them in the following order :—1st. Rounded and pointed Pigmy. 2nd. Triangular (or pen-knife) Pigmy. 3rd. Crescentic Pigmy. 4th. Rhomboidal Pigmy. The rounded and pointed Pigmy would be used for piercing the edges of the skins so that they could be sewn together by sinews. Next, for what purpose was the triangular or pen-knife Pigmy used? The solution of this problem is the reason why we are met here to-night, and it is the point we have had under consideration in this paper.

"Everything has been found necessary for the preparation of clothing, excepting certain implements which would be required for rendering the skin soft and pliable; these pen-knife Pigmies suit the purpose, and are always found mixed up with these other skin-preparing requisites. What, then, must be the inevitable conclusion? It is clear that, apart from the making of flint implements used for hunting purposes, skin-preparation would be a dominant occupation of the people, and large numbers of these small implements would be required. Any flint hunter knows that the proportion of pen-knife Pigmies in relation to other implements is very great indeed.

"Let us examine this so-called pen-knife Pigmy:—It has a haft, a shoulder, and a point. The shoulder is evidently a strengthening piece, to resist pressure when applied to the point in the direction of the shoulder. The haft must have been made to fasten into something, and the point is the business end of the tool. We are struck with their close resemblance to the carding teeth used for carding cotton to-day, and we have arrived at the conclusion that they were inserted in a wooden frame and used for carding skins. In the preparation of a skin, first of all, the skin must be dried; it is then hard and stiff, and quite unsuitable for clothing in this state. Before it is suitable for clothing, the skin must be made soft and pliable, by breaking up the fibres on the fleshy side of the skin, until they are quite loose. We have inserted a number of these pen-knife Pigmies in a block of wood, and we have brought a skin to show you, in a practical manner, what is meant. We have been strengthened in the solution of this difficulty by reading the following account, written by the late Dr. Livingstone. Many African tribes are experts in dressing skins, and the process as carried on by those of South Africa is thus described:—

"'The Makololo use all the skins of their oxen for making either mantles or shields. For the former the hide is stretched out by means of pegs, and dried. Ten or a dozen men then collect round it with small adzes, which when sharpened with an iron bodkin, are capable of shaving off the substance of the skin on the fleshy side until it is quite thin; when sufficiently thin, a quantity of brain is smeared over it, and some thick milk. *Then an instrument made of a number of iron spikes tied round a piece of wood, so that the points only project beyond it,* is applied to it in a carding fashion, until the fibres of the bulk of it are quite loose. Milk or butter is applied to it again, and it forms a garment nearly as soft as cloth.'

"The next type of Pigmy is called crescentic; it is a fish throttle. An exception is taken, by some authorities, to this term, because there are no rivers on the tops of the hills. But where are the reservoirs built to-day, to supply our Lancashire towns with water? On elevated ground. If not on the tops of hills, in the valleys between the hills. How are they fed? Surely by streams, supplied by the rain which falls on the hills. If you have mountain torrents, you will have fish, and to-day we have trout in the streams descending from the Rochdale hills: the trout will take a throttle, and so will eels, bream, chub, perch, and pike. March Hill is surrounded by reservoirs.

"The fourth or rhomboidal Pigmy is not found on the Rochdale Floor.

"The whole of the flint implements must have been made for the ordinary purposes of life. We have tried to show the requirements of this far-off age, and how the implements we found fit in with these requirements. Our opinion is that the whole of the flint implements found on the Rochdale Floor are mutually related and contemporaneous, and that they probably cover a period of time from early Neolithic right through into the Bronze Age, for we have found round barrows on our hills which we refer to the late Neolithic period, and earth circles which we refer to the early Bronze Age."

Mr. Sutcliffe was followed by the Rev. R. A. Gatty, LL.B., of Hooton Roberts, Yorkshire, who considered it somewhat remarkable that although these things occurred in certain parts of England, the Continent, and India, yet so far none have been found in Ireland and Scotland. Respecting the similarity of type, Mr. Gatty put a slide on the screen showing the Indian series, and these he compared with the English specimens, showing how all four of the main forms are repeated in both countries so far apart, indicating that the makers had the same idea in their minds, but what that idea was, he maintained no one had, in his opinion, given a satisfactory explanation. Mr. Gatty expressed himself as more anxious to fix the period or age to which they were related. In Belgium and France he found they were regarded as Palæolithic and not Neolithic as generally accepted here. In support of this argument he quoted the investigations of Dr. Sturge in the cave deposits in which they were found in France, the Auriguacien, the Monsterian, the Solutrean, and the Magdalenian, which appeared to be distinct in era from the India-Scunthorpe periods. The researches of M Adrien de Mortillet respecting French Pigmy flints, who regarded them as belonging to a period intermediary

between the Magdalenian and the Robenhausen. In conclusion, Mr. Gatty said it was not possible in a short paper to give more than an outline of the evidence that has been gathered regarding this remarkable manufacture of Pigmy flint implements.

Dr. Hy. Colley-March, of Dorchester, late of Rochdale, in a paper read by Mr. Sutcliffe, mentioned the position in the soil of the finds made in the Rochdale district, and thought that the implements would be more likely to travel downwards than upwards, and said that he had found barbed arrow-heads in the peat but the midgets always under the peat. He was of opinion that the people who made them belonged to a race intermediary between the Palæolithic and Neolithic men to whom he would apply the term Mesolithic, and he considered them to have been of a highly artistic temperament, using these tiny tools for the making and embellishment of combs or other objects necessary to daily life as in the Pacific Islands, where beautifully decorated articles were made without the use of metals. He considered it possible that the midget makers had spread by coasting from India and Egypt to the Mediterranean and Europe, and thought that early man in Europe at any rate had exceedingly good ideas as to decoration, judging from the artistic work found in the French caves.

In opening the discussion, Professor W. Boyd-Dawkins, after taking a survey of all the countries in which Pigmy flint implements have been found, arrived at the conclusion that the views propounded in the paper read by Mr. Sutcliffe were the correct ones, and particularly congratulated Mr. Sutcliffe on his skin-carding theory, a practical demonstration of which had been shown to the Congress.

Mr. W. A. Parker, F.G.S., of Rochdale, then addressed the Congress, and stated that as a collaborator with Mr. Sutcliffe he endorsed every word read in the opening paper, and drew particular attention to the finding together on the same undisturbed floor, of Pigmy implements closely associated with the Neolithic implements, proving that they were made by and belonged to the same race, and went on to state that these so-called Pigmy implements formed links in a complete chain of the work required to be done by this far-off Neolithic race in the preparation of skins for clothing.

Dr. Tattersall, Director of the Manchester Museum, and Mr. Ben H. Mullen, Director of the Salford Museum, also addressed the meeting on the value of research into the questions relating to these carefully wrought minute implements.

MANCHESTER FIELD NATURALISTS.

On January 6th the members of this Society met at the Portico Library to hear a lecture from Mr. E. C. Stump, of the Manchester Microscopical Society, on the subject, "Life on our Coasts." Mr. Stump dealt in his opening remarks with the pleasures and advantages awaiting the field naturalist in the study of marine zoology. Collecting on the sea shore, particularly after storms, and in rock pools was dealt with, and the structure and use of the tow net and dredge were explained, with the method of using them and the nature of the material obtained. With the fauna of many other districts was mentioned that of the Lancashire coast, the Hydrozoa and Polyzoa being specially mentioned, together with shells, barnacles, and marine worms. The fauna of the south coast of the Isle of Man was also referred to.

On Saturday, January 20th, the members of the Manchester Field Naturalists' Society met at the Portico Library in Mosley Street, when Alderman John Ward lectured on "Tongues in Trees." Alderman Ward said that plants had a tale to tell to those who would study them. To come in contact with a plant for the first time, and from description find out its name was a real delight and a lasting pleasure. Botany, as with any other science practically and lovingly studied, was an excellent subject for teaching observation. He explained how trees were grafted, and among a series of photographic pictures were specimens, shown in both winter and summer, taken mostly at Boggart Hole Clough, of the oak, ash, willow, poplar, beech, lime, alder, sycamore, mulberry, horse chestnut, sloe, hazel, and hawthorn. In remarking upon these, it was explained that hazel meant "to flog" in East England just as "to birch" meant chastisement in Lancashire. Hawthorn, the best of all hedges for defence against intruders, marked "the holy bounds of property."

The annual meeting of the Society was held on January 30th, when Sir William H. Bailey was re-elected as president, with Sir Charles Behrens and Councillor J. H. Thewlis vice-presidents. The other officials were all re-elected. Mr. J. Lunt read a very interesting report of the work of the past year, and it was decided that Windsor be the place for the excursion at Whitsuntide. Collections of beetles, moths, and botanical specimens were on view, and Mr. John Cantrill displayed interesting holiday sketches and water-colour drawings.

LIVERPOOL GEOLOGICAL SOCIETY.

At the January meeting of the Liverpool Geological Society, Mr. T. A. Jones contributed the first of a series of papers on "Petrographical Studies of Local Erratics." Numerous records of local erratics have been made in the past, notably by the late Mr. D. Mackintosh and later by the members of the Boulder Committee of the Liverpool Geological Society (which was afterwards merged into the North-Western Boulder Committee of the British Association). Hitherto, however, no systematic attempt has been made to describe the petrological features of the boulders which occur in the glacial deposits in the neighbourhood of Liverpool, and in referring them to their probable source of origin their external resemblance to well-known rock-masses in the north of the Liverpool district has been largely relied upon. Mr. Jones, in this preliminary paper, described in detail several types of boulders characteristic of the glacial clays in the vicinity of Liverpool, and compared their mineralogical and structural characters, as exhibited by thin sections, with those of important outcrops of similar lithological nature in the Lake District and Southern Scotland, giving useful criteria for identification, and illustrating his paper by lantern slides of photo-micrographs.

Mr. H. T. White exhibited and described a series of specimens forming the junction beds of the Keuper Sandstone and Upper Bunter Sandstone recently exposed at Birkenhead.

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RESEARCH WORK AND LOCAL GEOLOGY.

In dealing with local geology on January 26th, before the members of the Astronomical and Physical Section of the Preston Scientific Society, Mr. Edmund Dickson, F.G.S., made a special appeal for closer and more critical observation of the physical features. It was shown that there was ample room for research work, several questions relating to the geology of the district still being open for elucidation Special reference was made to the limestone formations of North-East Lancashire and the neighbouring portion of Yorkshire, the millstone grits of the Scorton district, the boulder clays and glacial deposits which covered such a large portion of the country in West Lancashire, the new red sandstone which crops out in the Ribble bed above Preston, the drifting sands, and other geological features.

REFERENCE LIBRARY SALFORD PEEL PARK

MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY.

The Control of Insect Pests in Canada.

On January 9th, Dr. C. Gordon Hewitt, F.E.S., Dominion Entomologist, read a paper before the members of the Manchester Literary and Philosophical Society on "The Control of Insect Pests in Canada." An interesting account was given of the ravages committed by these pests and the means taken by the Government to combat them. The annual opening up to cultivation of several thousands of square miles of land, previously wild, destroys the balance of nature, and swarms of insects, finding fresh stores of food available, devastate the new growths. These insects are in some cases of native origin, but are more frequently imported. Thus the Hessian fly, *Mayetiola destructor* Say, was introduced in 1816; the Wheat Midge, *Diplosis tritici* Kirby, in 1828; the Chinch Bug, *Blissus leucopteris* Say, in 1866; and the Colorado Potato Beetle, *Leptinotarsa decemlineata* Say, in 1870. Up to that time field and cereal crops had been the only sufferers, but the immunity of fruit and forest trees was not to last long. The Larch Sawfly, *Lygaconematus erichsonii* Hartig, only too well-known in the Thirlmere district, reached Canada in 1882 *via* the New England States. So serious was this outbreak that in a few years the mature larches over practically the whole of Eastern Canada were completely destroyed. About 1887 the first specimens of the Pear-Leaf Blister Mite, *Eriophyes pyri* Nalepa, were discovered in Nova Scotia, since which time the insect has spread over the entire breadth of Canada, from the Atlantic to the Pacific, and is increasing its ravages every year. The Clover-Root Borer, *Hylesinus trifolii* Müller, the Warble Fly, which attacks and weakens cattle and reduces their market value, the Apple Fruit-Miner, *Argyresthia conjugella* Z., the Apple Maggot, *Rhagoletis pomonella* Walsh, the San José Scale, *Aspidiotus perniciosus* Comst., and other kinds were also alluded to. In the case of the last named it was found necessary to pass an Act, known as the San José Scale Act, which prohibited the importation of trees, plants, and other nursery stock from countries in which the scale was known to exist. Later, in 1901, the restriction was removed, but infected plants were subjected to fumigation by prussic acid before being admitted. The latest of these "undesirable aliens" which has gained a footing in Canada is the Brown-tail Moth, *Euproctis chrysorrhœa* L., which ravages not only fruit trees, but the oak, elm, and maple. An active campaign is now carried on against it, the

new foliage being sprayed over with an insecticide fatal to the young larvæ. It had been supposed that the severe winters of Canada would have this result, but experience has shown that about 30 per cent. of the larvæ survive after being frozen in a block of ice for two months. Hence, attention is being given to the parasites of this species, and it is hoped to reduce their numbers by this means. At a later stage the parasites may produce a havoc among the invaders equal to that which the latter now cause to orchards and plantations.

The facility with which the economic importance of dealing with these pests had been recognised in Canada was referred to. The first efforts were made by the Canadian Entomological Society in 1863, and in 1871 a report issued by the Society was published by the Provincial Government of Ontario. In 1886, after the Dominion Government had taken the matter in hand, Dr. Fletcher was appointed official entomologist and botanist, and acted in the joint capacity till his death in 1908. A year later the offices were divided, Dr. Hewitt taking over the entomological department.

In the ensuing discussion Dr. Hewitt stated that the insect pests had not yet been kept under by their natural parasitic foes, but that this would follow in due course, with some assistance from his department. Professor S. J. Hickson, F.R.S., commented on Dr. Gordon Hewitt's paper, and on the entomological work carried on in both Canada and Great Britain. Mr. Francis Jones, Mr. C. L. Barnes, Mr. William Burton, and Mr. Joseph Mangan also took part in the discussion.

On January 23rd, Mr. Thomas Thorp made a short communication to the Literary and Philosophical Society relating to his experiments with transparent gratings and difficulties encountered with diffraction spectra. He exhibited instruments he had constructed illustrating his remarks, which he afterwards presented to the Society. Mr. J. R. Gwyther read a paper with the title "On the modes of rupture of an open hemispherical concrete shell under axial pressure." A note on the mechanical conditions involved in the above question was read by Mr. R. F. Gwyther, and in discussion Prof. Horace Lamb added to the subject.

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On January 29th Dr. E. Stanmore Bishop read a paper to the members of the Manchester Literary Club on "An Interview with a Phagocyte," in which he dealt in a quaint and unique manner with the struggle in the human system of health germs against disease germs.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 336.)

14 { 2cm., blue, scabrid, st. apex pruinose - *N. cœlestina* Fr.
1.5cm., striate, *papillate* ; st. glabrous - *N. exilis* Fr.

Nyctalis Fries.

Grow on decaying Agarics, especially *Russulæ*, in shady places. Gregarious and fasciculate.

Pilei pruinose with conidia.

1 { Conidia *smooth*, elliptical. Pileus whitish grey or tinged fuscous, or lavender - - *N. parasitica* Fr.
Conidia *stellate*. Pileus white to fawn. Gills very shallow - - - - *N. asterophora* Fr.

Omphalia Fries.

Contains mostly small, pretty species, many of which are found chiefly in upland localities, especially in damp, woolly places and mossy swamps.

1 { Pileus expanded, the edge incurved (as in *Collybia*) - 2
First campanulate, margin straight, first pressed to the stem (as in *Mycena*) - - - - - 32

2 { Gills white or whitish to grey - - - - - - 3
Gills brownish, tan, flesh-colour, yellow, etc. - - 22
Gills olive ; pileus plicate, 2cm., mouse colour *O. glaucophylla* Fr.

3 { Fragrant; 3cm., pallid, even, gills crowded *O. Luffii* Mass.
Without a spicy fragrant odour - - - - - 4

4 { Gills closely crowded, arcuate, narrow. Pileus 2-7cm. 5
Gills rather (some very) distant. Pileus 1-4cm. - 9

5 { Livid, white, 4-7cm., *striate* ; rooting *O. hydrogramma* Fr.
Golden yellow, 2-5cm., even - - *O. Postii v. aurea* M.
Dark grey, fuscous-tan to dark brown - - - 6

6 { Sooty-brown, 3cm., *striate*, g. *white*, *odour mealy*. *O. Maura*
Pileus not striate ; without odour of new meal - - 7

7 { 3-7cm., umber to pale ; st. slate ; in bogs - *O. telmatiæa* B.
Pileus 2-3cm. In woods, amongst moss - - - 8

8 { Dark grey, gills with decur. tooth - - *O. detrusa* Fr.
Tan-fuscous, stem *apex silky-striate* - *O. umbilicata* Fr.

9 { Gills *very* distant, broad, *triangular* ; p. fleshy, flat, 1-2cm., grey, yellow, brown, etc. **O. umbellifera* Fr.
Gills less distant and triangular ; pileus thinner - - 10

10 { Pileus even - - - - - - - - - 18
More or less striate, sulcate or plicate - - - 11

11 { Bright *orange*, 3cm , gills narrow, white - *O. Postii* Fr.
Diaphanous, white, 1cm., stem base radiately floccose. On sticks in woods - - - *O. stellata* Q.
Greyish, *downy*, 1.5cm.; *base white-floccose* - *O. velutina* Fr.
Without these characteristics - - - - - - 12

12 { 5-8*mm.*, grey-brown, stem same, *gills grey* *O. rustica* Fr.
Pileus 1-3*cm.*, gills whitish - - - - - - 13

13 { Whitish-grey, 1cm., plicate, crenulate ; stem long and slender - - - *O. pseudoandrosacea* Fr.
Stem comparatively short - - - - - - - 14

14 { *Rufous-brown*, 1-2cm., radiato-striate, glabrous *O. muralis*
Without these characteristics - - - - - - 15

15 { Yellowish-white to brownish-ochre, 1-3cm. In bogs 16
Brownish-grey, etc. On wet wood, among grass, etc. 17

16 { Substriate, brownish-ochreous, tough *O. sphagnicola* B.
Sulcato-crenate, pale buff to white - - *O. cæspitosa* Fr.

17 { Entirely striate, *glabrous*, livid brown - *O. striæpilea* Fr.
Livid umber to grey drying pale, *silky-floccose*, edge striate - - - - - *O. epichysium* Fr.

18 { Rufous flesh-colour, 2cm., tough ; on lawns. *O. hepatica* Fr.
Pileus grey or brownish-grey - - - - - - 19

* *var. abiegna* B. & Br., pale yellow ; on firwood.
var. viridis Fl. Dan., every part verdigris green.

19 { 3-4cm., becoming subrimose, gills *purewhite*. *O. leucophylla* Fr.
Pileus 1-2.5cm.; gills grey often drying darker - - 20

20 { Margin *erect*, gills lanceolate ; *stem long*, 4-6cm., base floccose. In bogs, fragile *O. philonotis* Fr.
Margin reflexed ; stem *short*, 1-2cm. long - - 21

21 { Entirely grey ; gills subdistant. In bogs. *O. onisca* Fr.
Stem fuscous ; gills distant, broad *O. griseopallida* Fr.

22 { Fœtid ; fuscous ochre, 1cm.; g. narrow. *O. abhorrens* B. & Br.
Grey, 2cm ; st. black-spotted ; g. pinky *O. atropuncta* Per.
Not fœtid ; without black specks on stem - - - 23

23 { Gills *crowded*, narrow, coloured as pileus - - - 24
Gills more or less distant - - - - - - 25

24 { Wholly flesh-colour or brownish, 2-3cm. - *O. offuciata* Fr.
Dull ochreous, 2cm., even, membranous *O. alutacea* C. & M.

25 { Obtuse, greenish to smoky, 3mm.; gills few, yellow ; stem yellow, tomentose *O. infumata* B. & Br.
Fleshy, flat, 1-2cm., brown, yellow, etc., gills same, very *distant*, *triangular* (*see 9*) *O. umbellifera* Fr.
Without these characteristics - - - - - 26

26 { Gills yellow, citrin buff or tan-ochre - - - - 27
Gills brownish, fuscous grey or purplish - - - 29

27 { Olive-yellow to grey, silky, 2cm., g. citrin *O. bibula* Q.
All dingy-ochreous, 2-3cm., substriate *O. sphagnicola* B.
Gills and stem golden-yellow (28*a*), or yellowish-buff (28*b*)

28 { *a* 2-6cm., brownish-yellow, floccose *O. chrysophylla* Fr.
b Yellowish-white, sulcate, 1-3cm. In bogs.. *O. cæspitosa* Fr.

29 { Pileus 1-2cm., *striate*, at least when moist - - - 30
Pileus *even*, 1-2cm - - - - - - - 31

30 { Minutely mealy, rufescent ; gills *purplish* *O. demissa* Fr.
Fuscous ; gills *brownish*, narrow, *subdistant*. *O. pyxidata* Fr
Rufous-brown ; g. pallid-brown, *distant* - *O. muralis* Fr.

31 { Umber ; gills narrow at both ends - - *O. retosta* Fr.
Brownish-grey ; gills *broadest behind* *O. griseopallida* Fr.

32 { White, up to 1cm.; gills *narrow*, *fold-like*. On sticks 33
Gills broader, perfect, unequal - - - - - 34

33 { Hemispherical ; stem slender, pubescent *O. integrella* Fr.
Trumpet-shaped ; stem base stellate *O. buccinalis* Sow.

34 { Wholly white ; up to 1cm. Growing on sticks, &c. 35
Pileus coloured ; up to 2cm. (*O. grisea* often livid grey) 38

35 { Nail-shaped, 3mm.; stem *with long hairs*.. *O. directa* B. & Br.
Stem not clad with spreading hairs - - - - 36

36 { Sulcate or striate when moist ; stem very slender - 37
Even, 3-4mm., diaphanous, hemispherical *O. bullula* Fr.

37 { 5-10mm., plano-depressed; sp. 4-5 x 2*u*. In moss. *O. fibula* Fr.
4mm. campan. *papillate, glabrous* ; sp. 8 x 2*u*. *O. gracilis* Q.
5mm., convex, downy ; stem *short*, base floccose ;
spores 6-7 x 3*u*- - - *O. gracillima* Fr.

38 { 2cm., *black-fuscous*, stem same; gills *crowded*. *O. umbratilis* Fr.
P. and stem yellow, orange or vermilion, 5-9mm, thin ;
gills *distant*. Amongst moss. **O. fibula* Fr.
Yellow-ferruginous, 1cm.; g. *rather crowded, veined* ;
stem bay. In fir woods. *O. campanella* Fr.
Pileus and stem brown, brownish, or greyish - - 39

39 { Fuscous, *cylindrico-campan.*, striate; gills *higher than broad*, whitish, on twigs - - - *O. picta*
Pallid, *infundib.*, *top-shaped*, the margin being recurved ;
base floccose, on reeds - - *O. Belliæ* Johns
Without these characteristics. In woods - - - 40

40 { Brown, edge grey, striate ; base strigose. *O. camptophylla* B.
Greyish then hoary, striate ; stem glabrous *O. grisea* Fr.

* *var. Swartzii* K. whitish, disc brown ; stem apex violet.

(To be continued.)

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On January 23rd the Darwen Naturalists' Society was favoured with a smart paper on "Rose Culture" by Mr. C. F. Grey. This was followed by Mr. J. H. Riley on "Protective Resemblance in Nature," on Jan. 23rd, and on Feb. 6th Mr. H. Roberts read a paper on "The Struggle for Existence in Plant Life."

Work and Workers.

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DR. J. W. ELLIS, F.E.S.

Among the many naturalists of whom Lancashire is the proud possessor, Dr. J. W. Ellis, of Liverpool, commands a foremost place, and he is held in high esteem by those lovers of nature who have been fortunate enough to make his acquaintance.

Dr. Ellis was born at Doncaster in January, 1857, but during the same year his parents came to reside in Liverpool, where in due course he was educated at a private school and then at the Liverpool Institute. It was during his school days that he became interested in natural history, and while scarcely in his 'teens he had formed a collection of Liverpool imports gathered chiefly during his wanderings around the Liverpool docks, and displayed, with appropriate labels, on planks laid across packing cases in an attic.

The Liverpool Museum always proved a constant source of attraction to him, and the greater part of his spare time and holidays were spent in poring over its varied collections, and he lost no opportunity of attending the lectures held during the winter seasons in the lecture theatre in the building—now practically superseded by the Rotunda Lecture Hall.

He had the good fortune to make the acquaintance of Henry Ecroyd Smith, a well-known archæologist and naturalist, who, at that time, was the Curator of the Meyer collection of antiquities in the Liverpool Museum, and it was during rambles with him that Dr. Ellis learned his first lessons in field botany, besides absorbing an amount of knowledge of archæological subjects, that paved the way for the study of certain branches of this subject in later years.

It was intended that he should be trained to succeed to his father's business—that of a chemist, and with this end in view he served a four years' apprenticeship, but ere this period was concluded he had taken preliminary steps for entrance into the medical profession, which he hoped would assist him to satisfy a great desire to travel abroad, in pursuit of natural history studies. Fate, however, decreed otherwise; family matters compelled him to settle down at home, as a practitioner of medicine.

He became a student at the Liverpool School of Medicine in 1876, where he gained several medals and prizes, and at the end of his second year he won the Roger Lyon Jones Scholarship and he also carried off the Silver Medal of the Apothecaries' Society of London for materia medica and pharmacology—the first occasion on which the prize had been gained by a provincial student.

Having qualified in due course he commenced practice in Liverpool, and with the exception of two years in the Isle of Wight and the Staffordshire Potteries his professional life has been spent in this city.

During his period of studentship he kept up his interest in natural history, especially in entomology, and he became a member of the Lancashire and Cheshire Entomological Society at its second meeting, in 1877. For several years he was Honorary Secretary of this Society, and for a score of years he worked at various groups of insects, more especially at the Coleoptera of the British Isles, of which he possesses a collection of over 2,000 species. He was also specially interested in the Coprophagous Lamellicorn beetles, and had collected material for a monograph of the *Aphodiidæ*, when the necessity for leaving Liverpool occurred, and the work was placed aside. He was elected a Fellow of the Entomological Society of London in 1886.

He was always greatly interested in economic botany, and in 1888 he won the Queen's Jubilee Prize (a gold medal and fifty guineas) offered by the Royal Botanic Society for the best essay on "The vegetable substances introduced into the arts and manufactures, and as food, during the fifty years of the [late] Queen's reign." The prize was presented by the late Duke of Teck, and copies of the essay were printed and freely distributed by the Society.

Dr. Ellis was one of the foundation members of the Liverpool Biological Society. He also took an active part in the work of the Liverpool Marine Biology Committee that was formed for the investigation of the marine fauna of Liverpool Bay, an association which resulted in the foundation of the Marine Biological Station at Puffin Island and subsequently at Port Erin, Isle of Man. He acted as Recorder of the Actinozoa (Sea Anemones, &c.), and his report on this group was published in the *Transactions of the Biological Society*.

He became a member of the Liverpool Naturalists' Field Club in 1882, and succeeded the Rev. W. Banister as Hon. Secretary, an appointment he held until his removal from Liverpool in 1889, when he was elected an honorary member and presented with an illuminated address. Since his return to Liverpool in 1891 he has taken an active part in the club, being elected President in 1899, and again Hon. Secretary from 1902 to 1909 in association until 1907 with the late Miss E. M. Wood. He was again elected President for the Jubilee year of the club, and since the death of Miss Wood he has acted as botanical referee. Realising the possibilities of photography in assisting in the study of natural history, he mastered the technical details of its processes. He became a member of the Liverpool Amateur Photographic Association in 1893, and every year since then he has devoted his summer holidays to work with the camera. He was elected President of the Photographic Association in 1897.

He is an exceedingly clever photographer, possessing many medals for this kind of work, and amongst these he is rightly proud of that of the Royal Photographic Society—the "Blue Ribbon" of photography. To his accession to the ranks of brethren of the camera he attributes a wider outlook on and greater love for nature as a whole, than was possible in the study of special groups of natural history objects. The practice of this art introduced to him many objects of antiquarian interest, and he has done much good work on the subject of ecclesiastical architecture; especially have mediæval baptismal fonts excited his interest, and of these he has a fine collection of photographs, and he has contributed both technical and popular articles on this subject.

Dr. Ellis has served as Vice-president of the Liverpool Botanical Society, of which he became a member in 1909; he is also on the South Lancashire Flora Committee of the Society. He is an enthusiastic worker, and has taken great interest in, and rendered much assistance to this Society.

During the last few years he has devoted much time to the study of Fungi, and his coloured drawings of these plants never fail to call forth much admiration from those who view them. He is especially interested in the group Pyrenomycetes, and at present he is engaged in collecting material for a fungus flora of the Hundred of Wirral, and of this he hopes to publish the first part during 1912. In 1910 he was elected a member of the British Mycological Society.

Besides being a naturalist and photographer, Dr. Ellis is a delightful lecturer, and his lectures, always illustrated with splendid photographs, are greatly appreciated by those who hear them.

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In addition to numerous scattered notes on natural history records, and articles of professional interest in medical journals, the following are the principal papers which Dr. Ellis has penned :—

Report on the Actiniaria of Liverpool Bay... ... ... *Proc. Liv. Biol. Soc.*, 1886

Cylista coccinia, an Actiniarian new to Liverpool Bay *id.* 1887

The Naturalist in Snowdonia ... ... *Red Dragon*, 1887

Notes on the Cooke Collection of British Lepidoptera ... *Proc. Liv. Lit. and Phil. Soc.*, 1887

Jubilee Prize Essay, "Fifty Years of Economic Botany," Royal Botanic Society, 1888

On the unusual abundance of the Madder Hawk Moth in 1888 ... ... *Research* I., 1889

The Coleopterous Fauna of the Liverpool District *Trans. Biol. Soc. Liv.*, 1889

The Lepidoptera of Lancashire and Cheshire *Naturalist*, 1890

On the Secondary Sexual Characters of the British Coleoptera *British Naturalist*, II., 1892.

The Mediæval Baptismal Fonts of the Hundreds of West Derby and Wirral.. *Trans. Hist. Soc. Lanc. and Ches.*, 1901

The Mediæval Fonts of the Hundreds of Leyland and West Derby ... *Memorials of Old Lancashire*, 1909

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On December 20th, Miss Hannah Byrne dealt with the subject of "Palæolithic Man" before the members of the Blackburn Field Club. Interesting flint implements were on view in addition to the lantern illustrations. On Jan 10th Mr. John Lovelady treated of "British Ferns" with special reference to progress in the last century. On Jan. 24th Mr. Abel P. Bradshaw gave "Marvels of the Minute," and on Feb. 7th Mr John Frankland spoke of "A Piece of Coal."

"THE SYSTEM OF THE STARS"

Items from Fr. Cortie's Presidential Address to the Preston Scientific Society.

On January 25th, at the Lecture Hall of the Harris Free Library, the Rev. Fr. Cortie, S.J., F.R.A.S., delivered his Presidential address to the Preston Scientific Society, taking as his subject "The System of the Stars." He said that in the history of any service the progress of the ideas and concepts upon which our knowledge was founded was of absorbing interest. Not less was this the case with astronomy, the oldest of all the sciences, which, founded upon the sure basis of arithmetic and geometry, successively annexed the services of mechanics and dynamics, and in these later days had gathered under its mantle the whole domain of physics. The science was divided into two branches—gravitational astronomy, the older, which dealt with the movements, the distances, and the masses of the heavenly bodies; and the branch which saw its inception with the application of the telescope to astronomical observations at the beginning of the seventeenth century by the illustrious Galileo and his contemporaries, and had been immeasurably advanced by the advent of the spectroscope and of the photographic plate. This branch, atrophysics, dealt mainly with the appearances and the constitution of the denizens of the sky, though even their movements did not escape the delicate test of spectroscopic analysis.

Early Beliefs in the Fixity of the Earth.

Fr. Cortie commented on the early impressions of a flat earth, with the succeeding theory that the earth though spherical was immovably fixed, as the centre about which the sun, the moon, the planets, and the fixed stars revolved, and he referred to the fact that even the fixity of the earth was afterwards doubted by some philosophers, for its rotation and revolution were maintained by Philolaus and Aristarchus, and the doctrine received a huge shock by the discovery of the precession of the equinoxes by Hipparchus, a century and a half before the Christian era. The authority of that giant among the brilliant intellects of the human race, Aristotle, was, however, thrown into the opposite scale, and for centuries to come the earth was to be regarded as the fixed centre of all celestial movements. And yet the planets moved independently of the spheres, which carried them in their diurnal motion round the earth. It was then that Ptolemy, who flourished at Alexandria about the year

140 A.D., by his ingenious system of deferents and epicycles, was enabled to give a reasonable geometrical theory of the movements of all the known planets, including the sun and the moon, around the fixed and immobile earth.

The Sun as the Centre of the System.

It was not until Nicholas Copernicus (1473-1543) had had the audacity to contradict, as he himself expressed it, "the received opinion of mathematicians, and almost the authority of common-sense," by the publication of his book, "On the Revolutions of the Orbs of Heaven," the first printed copy of which he received on his death-bed, that the earth was dispossessed of its pride of place as the central orb of the celestial sphere. Yet neither Copernicus nor his doughty champion, Galileo, could prove their position. All that could be said in its favour was that it was more probable that the earth revolved than that the whole of the heavens turned about it. All phenomena then known could be equally accounted for upon either the Ptolemaic or the Copernicon hypothesis, although when men began to scan the face of the skies with telescopes and saw that the sun, the moon, and several of the planets rotated on their axes, the argument from analogy came to lend its weighty aid in favour of Copernicus.

Two centuries later, when, in 1726, Bradley discovered the aberration of light, a satisfying and clinching argument was given in favour of Copernicus. At the same time, the doctrine had by then been almost universally accepted by astronomers, and had led to the discovery of the laws of the motions of the planets round the sun by Kepler, and the explanation of his empirical laws by the illustrious Newton, as the natural consequence of the universal law of gravitation.

Movements of the Stars.

To the mind of the astronomer nothing was fixed, nothing was stable. The earth was carried round the sun while rotating on its own axis, and meanwhile the sun and all the attendant planets were rushing through space, as first determined by Sir William Herschel, and amply confirmed by modern researches, at the rate of some 12½ miles per second. In a comparison between the positions of the stars marked down in recent catalogues with those set down by Bradley 150 years ago, it was found what the telescopic eye alone could observe, that the relative positions had changed, therefore the stars were moving. The light they sent us was also in motion at the enormous velocity of 186,000 miles a second. The stars were viewed

from a moving platform, and one that was wobbling or swaying, as was predicted by the Greek philosophers of the "crystalline sphere." This latter motion caused the pole of the earth to describe a circle about the fixed circle of the ecliptic, once in a period of about 25,800 years. At the present time the pole pointed to a spot about 1¼ degrees from the bright star in the tail of the Little Bear, known as the Pole Star. At the time when Hipparchus constructed his catalogue of the stars it was 12 degrees further removed, and in about 12,000 years hence the brilliant star Vega would serve as the pole star. The sun by this condition appeared to cross the equator and go north a little later every year. The phenomenon was due to the attraction of the sun and the moon upon the redundant ring of matter at the earth's equator, owing to its departure from the truly spherical state, and which projected above the true contour of a sphere.

But the sun and the moon were not always pulling at the earth's excrescence, as they changed their positions with regard to the plane of the earth's equator in definite periods. And as the circle traced by the pole among the stars was in the form of a wavy curve with 1,400 waves in the circumference, it was completed in the 25,800 years. The stars were evidently affected in their relative positions by these motions of the earth, so that before they could detect their proper motions they must eliminate their changes of position due to the swaying and moving plane of observation. Light had an enormous velocity, and yet not so great but that it could be combined with the motion of the observer carried on to the earth round the sun at the rate of about 18 miles a second. Thus was caused the apparent displacement of a star, when observed at any moment, which was called aberration. Again, as the sun moved off towards the constellation of Hercules, with his attendant planets, the stars in front apparently opened out, those behind closed up, while in other regions of the sky they drifted backwards. But man could live a hundred years and more and not detect these apparent movements in the stars with the unaided eye, except that displacement due to precession. In taking count, therefore, of star movements, they must be corrected for all these reflected displacements, which were in reality terrestrial. But there still remained a proper motion inherent in the stars, and it was one of the triumphs of modern astronomy to have been able to unravel it.

Reference was made to the enormous dimensions of our own solar system, and to the fact that our sun was but one among a host of suns, of which, it was calculated, over 100,000,000 must probably be visible by the aid of the giant Lick telescope on Mount Hamilton, San José, California. He referred to the immense distances of the stars, and the method of measuring them. Light, which was the swiftest moving entity of which we had any cognisance, the rate of motion being 186,000 miles a second, took 4½ years to come from the nearest star, Alpha Centauri, to our eyes. It had been computed that all the spinning mills in Lancashire made daily a thread of cotton which was 155 million miles in length. At the same rate of working they would take 460 years to make a thread which would reach to the nearest fixed star.

In a delightful and eloquent conclusion Fr. Cortie laid emphasis on the compatibility of science with religion.

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MANCHESTER ASTRONOMICAL SOCIETY.

On Feb. 7th, Fr. Cortie lectured before the Manchester Society on the disappointing expedition to the Tonga Islands in April of last year with the object of taking observations of the solar eclipse.

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The Irwell in the Past.

In an interesting letter to the *Manchester City News*, in reference to the City Surveyor's statement that the "Inky Irwell" was once an attractive, pellucid river, and that in the eighteenth century salmon and other fishing in the Irwell was most rigidly protected, Mr. Walter E. Lythgoe says: "My father, Mr. I. Lythgoe, founder of the Agecroft Rowing Club, has seen fish caught in the Irwell, from Fisherman's Rock, which is just below the junction of the River Medlock with the Irwell, and opposite the old boathouse owned by the late Mark Addy. My father has himself caught dace and gudgeon in the Irwell with a stick for a rod, a piece of string for a line, and a bent pin for a hook. He has also seen some good-sized trout below Regent Road Bridge and up at Stoneclough, Ringley. The first president of the Agecroft Rowing Club, the late Mr. R. N. Phillips, had seen fine salmon caught at Bradley Wharf Ford, a little above Drinkwater Park, near Agecroft Bridge."

WITH THE ANTIQUARIANS.

At a meeting of the Lancashire and Cheshire Antiquarian Society, on January 12th, Mr. A. Nicholson read a paper dealing with manuscripts of dates from the thirteenth to the sixteenth century. These were fragments of Books of Hours and from the earliest printed books. Mr. W. Charlton sent three of the Canadian coins, dated 1911, from which had been omitted the words "Dei Gratia." These had been withdrawn, but not before much indignation had been expressed at the omission. A paper was read by Mr. Henry Broxap on "Thomas Deacon: additional information concerning the greatest of sinners and most unworthy of primitive bishops." An engraving of Warrington Market Place, by T. Dixon, 1834, was presented to the Society by Mr. C. T. Tallent-Bateman. Mr. W. Ellis communicated a short paper, which was read by Mr. C. W. Sutton, on the public-house known as John Shaw's Punch House and Club, the site of which, from an examination of various directories and references, Mr. Ellis found to be No. 5, Old Shambles, or the last house on the south side (in 1800), and shown on Green's map as adjoining Smithy door. Mr. J. J. Phelps exhibited specimens of so-called "Abbey pieces" or "Abbey money," which had been found at Vale Royal, and it was explained that they were used in mediæval times for purposes of computation before Arabic numerals came into general use for arithmetical calculations.

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MANCHESTER GEOLOGICAL AND MINING SOCIETY.

On January 9th, before the members of this Society, Mr. James Lomax dealt with the study of coal under the microscope. This was illustrated by lantern slides, and Mr. Lomax contended that these confirmed a statement he made in a paper read at the April meeting as to there being bands of resinous matter in coal. These bands were clearly discernible under the microscope, and the knowledge of their presence should warn the miner that the working of them caused the most inflammable dust it was possible to imagine. Mr. A. J. Tonge suggested that if Mr. Lomax could get the coal still thinner for his microscope, as he doubtless would do in time, it might transpire that there was no black about coal at all, and that probably those parts which we thought were carbonised were red spores. If that were so it looked as if we should have to alter our ideas of coal formation, as to whether there had been so much peat about it as we thought.

A description of weldless steel chains for mining and other purposes was given by Mr. Alexander G. Strathern.

MANCHESTER MICROSCOPICAL SOCIETY.

About sixty members of the Manchester Microscopical Society visited the Manchester University on Thursday, 18th January, on the invitation of Professor Weiss, President of the Society. After partaking of refreshments in the elementary laboratory, the members were conducted over the new botanical laboratories, Professor Weiss explaining the use of each of the departments and the special fittings and apparatus connected therewith.

In the research laboratory there were a number of exhibits of botanical interest. A series of plants from the Leo Grindon Herbarium were on show, illustrating the special features of this collection, which differs from the usual botanical herbaria in including not only dried specimens of various plants, but illustrations and descriptions taken from various standard botanical works and periodicals. This renders the herbarium particularly suitable for teaching purposes, as students do not require to hunt up published accounts of any particular plant, but find all the necessary information in close proximity to the actual plants. The particular specimens chosen illustrated the range of variation in the foliage of the maple, and also the brilliant colouring assumed by many of the American species of this genus. The leaves of the lattice-leaved plant were also included, and other plants with interesting foliage.

A series of drawings and dried specimens were also exhibited as a means of illustrating the laws of heredity in plants, and the Mendelian segregation of characters. Some experiments on this subject have been carried out by Professor Weiss in connection with the colour inheritance in the Common Pimpernel. The scarlet Pimpernel when crossed with pollen of the blue variety, produces in the first generation plants with scarlet flowers, exactly like those of one of the parents; in the second hybrid generation 25p.c. of the offspring diverted back to the blue colour, and this is repeated in successive generations. The same phenomenon is presented by crossing the common form of the Greater Celandine with the pollen of the cut-leaved variety—the common form is dominant, the cut-leaved variety reappears in the second generation in 25 per cent. of the offspring.

Various forms of offspring from the hybrid between the Common and the Water Avens were also shown, some of these resembling the one parent more than the other, and some forms in which the colour of the petals had been completely lost.

In addition to the dried plants there was a series of exhibits illustrating the various ways in which fossil plants are preserved, and sections showing detailed structure of many of these plants.

After inspecting the laboratories the members assembled in the lecture room, where Professor Weiss explained the mechanism of the Zeiss Epidiascope, which had been presented to the department. By means of this instrument he threw on to the screen, not only lantern transparencies, but also, by reflected light, solid objects such as plant impressions, book illustrations, and living aquatic animals. With the aid of a microscope attached to the apparatus, the audience was able to see actual sections illustrating the structure of Coal Measure plants.

The President then commenced an address on the "Microscopic Examination of Fossil Plants."

At the annual meeting of the Society it was shown to be in a very flourishing condition. The Council for 1912 was elected as follows: President, Professor Weiss; vice-presidents, Messrs. J. L. W Miles, H. G. Willis, and E. C. Stump; treasurer: Mr. F. B. Cocker; secretary: Mr. Fredk. Dishley; librarian: Mr. J. E. Storey; curator: Mr. A. P. Bradshaw; council: Messrs. B. Clayton, W. Cookson, J. Eastwood; W. R. Emmins, G. M'Kechnie, F. W. Parrott, R Pettigrew, W. A. Rogerson, and A. Winterbottom.

The annual meeting of the Mounting Section of the Society was held on January 11th, the election of officers for the current year taking place. Mr. E. Watzlaff, who had been secretary of the section for the past eight years, resigned owing to pressure of business, and Mr. E. Reeves was elected in his stead. After the election of officers the evening was devoted to an exhibition of slides.

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On January 22nd, the members of the Microscopical Section of the Preston Scientific Society spent a delightful evening in inspecting a fine collection of microscope slides of botanical interest, recently presented to the Society by Dr. F. W. Collinson. Included with these are a number of clever drawings by Dr. Collinson of objects appearing on the slides.

On January 29th the evening was taken up with the perusal of a number of slides of algæ and zoophytes brought by Mr. John Abbott.

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Remarkable Movements of the Little Auk.

In common with other counties, Lancashire and Cheshire were visited during the recent severe spell of weather by numbers of the Little Auk (*Mergulus alle* Linn.). Many of the reports that have reached us lack authority, but the bird appears to have spread itself out over both counties. A rare bird with us at the best of times, it appears to have set up a remarkable record for itself by the manner in which it has been driven from its natural haunts.

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In South Lancashire.

Two specimens of the Little Auk (*Mergulus alle* Linn.), have been caught alive in Rochdale recently. The first specimen (a female), which was caught alive on Thursday, Feb. 1st, in the Mitchell Hey factory yard, by P.S. Whitfield's son, lived for three days. The second (a male) was taken alive by Mrs. Williams in the garden of her house, Spring Cottage, Smallbridge, on Monday, February 5th. It lived only a few hours.

These are the first authentic records of the bird having been caught in South Lancashire. In his "Birds of Hollingworth" Stott says that several specimens visited the district in January, 1869. He, however, gives no authority for this statement, nor does he say whether any specimens were shot or captured. Consequently, his record has been open to doubt.

Both the birds caught this month are in the possession of Mr. W. Lord, taxidermist, of Smallbridge.

February 12, 1912. F. WILLIAMSON.

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Its Appearance Inland.

During the recent cold weather many specimens of the Little Auk have been reported from various parts of the country, and I know of at least two which were found, in an exhausted condition, so far inland as Coventry, whilst I learn that during the same week specimens were also found at Birmingham and London.

These Arctic seabirds do not often stray so far South, but no doubt lack of food and gales had driven them from the usual haunts. It is interesting to note that these Little Auks were clad in their winter garb—head, back, and wings black; the rest of the feathers white.

H. J. WHELDON.

"PROCEEDINGS OF THE LIVERPOOL GEOLOGICAL SOCIETY," Part ii., Vol. xi., 1911.

This volume embodies the chief papers read during the session 1910-11, which relate almost exclusively to various branches of local Triassic geology. The contribution of the President, Mr. W. Hewitt, B.Sc., A.R.S.M., comprises a useful bibliography of works and papers on the geology of the country about Liverpool from 1890-1909 (thus forming a much-wanted continuation of the lists of the late Mr. Morton), as well as a Presidential Address which deals with the question of the physical conditions under which the Triassic rocks of Britain were formed. Mr. H. C. Beasley, in his paper, "A Description of a Group of Footprints of the Storeton Find of 1910," describes in fuller detail than has hitherto been possible the characters of prints of a Chelonoid type found in Wirral, which resemble the footprints occurring in the Triassic rocks of Elgin, N.B., as described some years ago by Prof. Huxley. Mr. F. T. Maidwell also describes from the Keuper Sandstone of Runcorn footprints of several Rhynchosauroid forms under the generic name of *Rhynchosauroides*, and includes a new species, *Rhynchosauroides membranipes*, the prints of which are a pentydactylate form with straight digits, terminating in sharp claws, with a well-marked interdigital membrane—the first undoubted example of webbed prints from the Liverpool Triassic area. Both these palæontological papers are illustrated by plates. Working in another field, Messrs. C. B. Travis and H. W. Greenwood furnish a valuable contribution to Triassic knowledge by their paper "The Mineralogical and Chemical Constitution of the Triassic Rocks of Wirral." By the use of heavy density liquids the mineral constituents of the sandstones and marls of the Wirral Peninsula were isolated. Twenty-six mineral species were determined by the authors, and a full description of the crystallographic and mineralogical characters is given, together with a table showing the distribution throughout the various horizons. The chemical constitution of the same rocks is also dealt with, and numerous analyses are given, with a plate showing in graph-form the soluble material determined over nearly 2,400 feet of strata from cores of the Heswell deep boring. From the result of their investigations, the authors come to the conclusion that granitoid rocks have furnished the bulk of the material which has formed the strata of Wirral, and they state that the evidence afforded by the assemblage of minerals points to the fact that the material of the Cheshire area has been derived from a different source of origin from that of the Triassic rocks of South-west England and the Midlands.

PIGMY FLINT IMPLEMENTS.

We give below a list of the exhibits used for the illustration of the discussion on Pigmy flint implements. These had been carefully arranged by Messrs. Jackson, Sutcliffe, Parker, and Gatty, in order to illustrate the varieties of form, and the districts from which the specimens had been obtained.

Specimens had been lent by :—

The Rev. R. A. Gatty, LL.B., which had been found at Scunthorpe, S. Yorks ; Manton Common, Lincs.; Horsham, Sussex ; Hooton Roberts, near Rotherham ; March Hill, Rochdale ; Lakenheath ; the Vindhya Hills, India ; and Egypt.

Messrs. Sutcliffe and Parker : Flints found in the Rochdale area ; the Pennine Chain ; Scunthorpe ; Shore Moor, etc.

Dr. Colley-March : Specimens found in India, France, Isle of Man, Yorkshire, and Derbyshire.

The National Museum of Ireland : A collection of small implements of Chalcedony, Agate, Jasper, etc., found by Carlyle, of the Archæological Survey of India, in caves and rock shelters on the Vindhya Hills, Central Provinces of India, comprising crescent-shaped implements, triangular, curved and pointed, knives, borers, flakes, quadrangular, and cores.

Mr. H. Emmott : Various types of small implements from the Rochdale district.

Messrs. S. S. Platt and Magson : Various types from the Rochdale district.

The Rochdale Museum : Local finds of various types of Pigmies and larger implements.

Dr. Sturge : Four cases of minute implements from the Vindhya Hills, Central India, illustrating the four principal types found in that district and other forms associated with them. Also three cases of minute implements from Wangford and the N.W. district of Suffolk, which show an intimate relationship with the Indian forms.

One case showing specimens from various parts of England.

Four cases of specimens from the French caves of the Dordogne, Tarn et Garonne, and Mentone, which are considered as of Palæolithic date. The pieces are small, but do not fall strictly into line as regards type with the Indian-Wangford series. The shouldered type is present but very rare.

One case from Helouan, near Cairo, Egypt, a series more nearly allied to the Indian-Wangford than the French cave series.

One case from the Libyan Desert, near the Fayoum, Egypt, more allied to those of Mentone.

One case from the Desert of Sahara, allied to the Indian-Wangford series.

One case from the Algerian caves, a rough series which have been considered older than the Mentone specimens, and perhaps the oldest midgets yet found.

One case from near Sydney, N.S. Wales, somewhat like the Helouan series.

One case of a comparative series from various countries.

Six large specimens of flints from Brandon, Suffolk, of the form and type of the midgets.

The Manchester Museum :

Specimens from the Darbyshire Collection : One case miscellaneous Pigmies.

One case small stone arrow-heads from Askalon (Darbyshire Collection).

Two cases from the Cairns Collection. Australian specimens of surgical knives, etc.

Specimens of types from the Vindhya Hills, India.

Specimens of Neolithic implements of normal size and type from the Rochdale area, also Reddle, Brown Hæmatite, Graphite, Pebbles, and Iron Pyrites found associated with them.

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The disposal of the late Mr. Robt. Cairns' collection of shells is to take place on Friday, February 23rd, in Manchester.

A Woodcock was found to have been driven to take refuge on a signal box near Blackburn during the recent storm. It lived but a short time.

A Little Auk is reported to have been found in the yard of a house occupied by Mr. A. Rigby at West View, Clitheroe, on February 1st.

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LANCASHIRE AND CHESHIRE ANTIQUARIAN SOCIETY.

Annual Meeting.

At the annual meeting of the Lancashire and Cheshire Antiquariau Society, held on January 26th, under the presidency of Alderman Fletcher Moss, a very interesting report for 1911 was read by the Hon. Secretary, Mr. J. J. Phelps. The valuable archæological excavations at Vale Royal, Cheshire, under the supervision of Mr. Basil Pendleton—when the plan of probably the largest Cistercian abbey church in the United Kingdom was brought to light—were specially referred to, as was also the publication of the second interim report of the excavations at the Roman forts at Castleshaw in 1908, incorporating the work of Mr. S. Andrew, Major Lees, and Mr. F. A. Bruton. Mr. T. May, another member, is likely shortly to put in further work at the Roman fort at Ribchester, and the Warton Caves will be further exploited under the direction of Mr. J. W. Jackson, who has already read two papers on the subject before the Society. The Council had been communicated with in relation to the proper control, acquisition, or protection of the ancient monuments of the two counties, and the matter was being cerefully considered.

There were the usual interesting exhibits. Mr. N. Heywood displayed an old silver cup, date marked 1783, which had been presented to Mr. Nathan Gough for adapting his patent steam engine to agricultural purposes by the Manchester Agricultural Society in 1830. Mrs. Ashworth presented an engraving of York Minster to the Society, and she exhibited a curious old miniature of William III. Dr. Bowman showed a portrait of John Dalton, by J. Stephenson, and other interesting items.

Mr. S. W. Partington read a paper on the importance of preserving a record of historical MSS. and portraits.

Mr. A. Nicholson was elected President for the ensuing year, with Dr. W. E. A. Axon, Colonel French, Rev. H. A. Hudson, Alderman Fletcher Moss, and Mr. C. W. Sutton as vice-presidents. On the Council were also elected Messrs. E. Axon, S. Andrew, C. T. Tallent Bateman, F. A. Bruton, Professor Boyd Dawkins, Lieutenant-Colonel Fishwick, N. Heywood, D. F. Howorth, T. Cann Hughes, W. Long, R. Peel, John Swarbrick, and I. Whitaker. Honorary Treasurer, Mr. W. Harrison. Honorary Secretary, Mr. J. J. Phelps.

Notes from Periodical Journals.

The Field, Jan. 13th, p. 92.—A note from Mr. C. S. Robinson (East Molesey), stating that he watched a House Martin flying round Hampton Court Palace on January 10th.

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The Field, Jan. 20th, p. 142.—Mr. L. Ford, of Lancaster, writes that on January 3rd he watched a pair of Waxwings amongst a flock of Redwings near Lancaster.

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The Field, Jan. 27th, p. 188.—A note from Mr. William Ed. Winter, Burwash, Sussex, on finding a nest of the Wild Duck (*Anas boscas*) containing ten eggs on January 22nd. Unfortunately both duck and drake were shot before the discovery of the nest.

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The Zoologist, Jan. 15th, pp. 1-14.—A very interesting article by Messrs. Fredk. J. Stubbs and A. J. Rowe on "The Prehistoric Origin of the Common Fowl," wherein the authors present their reasons for believing that the Common Fowl was well-known to the earliest Egyptians and Mesopotamians, and had not an Indian origin as is popularly supposed.

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The Zoologist, Jan. 15th, pp. 34-35.—An interesting account of a Golden Eagle (*Aquila chrysaëtus*) is furnished by Mr. Edward A. Fitch (Brick House, Maldon, Essex). The bird died recently, and was known to be at least 67 years old, and had been in the family of Mr. Garratt most of that time. The bird was a female, and laid some 25 eggs during her long life in captivity.

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British Birds, February 1st, pp. 234-237.—A very interesting illustrated article by Mr. W. R. Ogilvie-Grant concerning the moult of our English Partridge (*Perdix perdix*). Mr. Grant records, I believe for the first time, that just as Ducks have an "eclipse" plumage during the summer, so do Partridge, both male and female. This plumage replaces for two months the normal feathers.

[Regarding what is termed "eclipse" plumage in Ducks, until quite recently this "eclipse" plumage was supposed to be

confined to the males only, but more than one ornithologist has pointed out species of the Duck family in which both male and female have an "eclipse," and personally I am inclined to think all the Ducks have "eclipse" plumages, and as time goes on we may find that *all* birds possess an "eclipse" plumage.—F.W.S.]

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British Birds, Feb. 1st, pp. 238-241.—Three new British birds are recorded, namely, two male Collared Flycatchers (*M. collaris*) obtained on May 12th and 13th respectively last year at Udimore Lane, near Winchelsea, Sussex. A Pine Bunting (*E. leucocephala*), from Fair Isle, on October 30th, 1911, a male, and a Thrush-Nightingale or Sprosser (*L. luscinia*), also from Fair Isle, obtained there on May 15th, 1911.

[Although the Sprosser has occurred in Great Britain before, the records have never been accepted as those of truly wild migrants, but Mr. W. Eagle Clark's specimen from Fair Isle puts the bird on the British List as a true migrant to these shores.—F.W.S.]

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British Birds, Feb. 1st, pp. 243-244.—Mr. T. A. Coward records the wintering of a Blackcap (*Sylvia atricapilla*) in Somerset, a male bird in winter plumage being brought in by a cat on January 19th. Mr. Coward gives some interesting notes of this bird's winter plumage, the most striking point being that the belly and axillaries are distinctly suffused with pale yellow.

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British Birds, Feb. 1st, p. 247.—A note from Mr. H. W. Ford-Lindsay to the effect that six Ferruginous Ducks (*Fuligula nyroca*) were observed and two obtained, a male and female, on the flooded marshes at Crowhurst, in Sussex.

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British Birds, Feb. 1st, p. 247.—Mr. H. E. Forrest records a young male Long-tailed Duck (*Harelda glacialis*) from Malldreth Bay, Anglesey.

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British Birds, Feb. 1st, pp. 249-252.—Mr. H. W. Robinson records a Black-tailed Godwit (*Limosa belgica*), shot at Glasson Dock, at the mouth of the River Lune, North Lancashire, on December 9th, 1911. [This is believed to be only the fifth record of the species for Lancashire, the last record being a pair which came into my possession on January 22nd, 1898, in the

flesh, and which had been shot at the mouth of the Lune.—F.W.S.]. Also a Pomatorhine Skua (*Stercorarius pomatorhinus*) shot on November 10th, 1911, in the Lune Estuary, close to where, on November 28th, 1908, I obtained a specimen.

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Scottish Naturalist, January, 1912, pp. 9-15.—Some very interesting records of rare birds from Scotland, the chief being two Richard's Pipits (*Anthus richardi*), one obtained, on Fair Isle, October 6th, 1911. An immature example of the Woodchat Shrike (*Lanius pomeranus*), taken at the Light on the Isle of May, October 19th, 1911, this being the first authentic record for Scotland. A Serin Finch (*Serinus hortulanus*), an adult male captured by some bird catchers on November 9th, 1911, near Edinburgh. Again the first recorded example of this species in Scotland. An immature male Montague's Harrier (*Circus cineraceus*) was shot during the latter part of August at Newlands, Newcastleton, N.B. This makes the seventh record of the species in Scotland. An adult female Baird's Sandpiper (*Tringa bairdi*) was obtained by Mr. W. Eagle Clark on St. Kilda, on September 28th, 1911. This North American species has only been recorded twice for the British Isles. [The above records are beyond reproach and are authentic, as they are recorded by such well-known ornithologists as Messrs. W. Eagle Clark and O. H. Wild, the Misses Rintoul and Baxter, and the Duchess of Bedford. I should here like to draw the attention of readers of the *Lancashire Naturalist* to the really splendid work which has and is being done by a few well-known ornithologists in Scotland, by visiting certain small islands round the coasts during the spring and autumn migrations. The records obtained are really surprising, and add greatly to our knowledge concerning the mystery of bird migration.—F.W.S.]

Feb. 3rd, 1912. F. W. SMALLEY.

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Messrs. Cassell and Company are issuing in part form the book of Richard Kearton on "British Birds' Nests," and this is an opportunity to be taken advantage of by those who have not already become possessed of it. The first part appeared on Jan. 31st, and it is to be published fortnightly. The first part treats of the Blackbird; Blackcap; Corn, Reed, Snow, and Cirl Buntings; Common, Rough-legged, and Honey Buzzards; Capercaillie; Chaffinch; Chiff-chaff; Chough; and Bullfinch. The chief attraction of the work undoubtedly lies in the beautiful reproductions of the Bros. Kearton's photographs. S.S.

In the *Journal of Botany* for this month, Mr. W. B. Grove, M.A., describes further "New or Noteworthy Fungi." This is the conclusion of a valuable series of notes, and the descriptions of the plants recorded, especially those of newly-named species, together with numerous observations on many little-known micro-fungi, will be very useful to students of these plants.

In the same issue the biography of Sir Joseph Dalton Hooker by G. S. Boulger, F.L.S., is concluded, and R. M. Cardew, F.L.S., and E. G. Baker, F.L.S., discuss some points of interest concerning the genus *Plantago*.

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The first number of *The Scottish Botanical Review*, a quarterly magazine, contains "Remarks on some Aquatic Forms and Aquatic Species of the British Flora," by A. Bennett, A.L.S.; a comprehensive article on "The Geological Relations of Stable and Migratory Plant Formations," by C. B. Crampton, M.B.; and "Some Modern Aspects of Applied Botany," being the Presidential Address to the Botanical Society of Edinburgh, November, 1911, by A. W. Borthwick, D.Sc.

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In the *Journal of Clinical Research* for January, attention is called to the fact that Bacilli which have hitherto been regarded as pathogenic to animals only, are sometimes in close inter-relationship with the diseases of plants. Mr. J. R. Johnston, of the U.S. Department of Agriculture, has traced the disease known as *bud-rot* in the Cocoanut Palm to the *Bacillus colicommunis*, or an organism that cannot so far be differentiated from it. This opens up the possibility of hitherto unsuspected sources of contagion in the diseases of both man and animals, which need immediate investigation.

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The impressions of some of the foreign members of the recent International Phytogeographical Excursion are given in *The New Phytologist* for January. Prof. H. C. Cowles (Chicago University) expresses amazement at the vast amount of wild country in densely populated England. Prof. Jean Massart, of the University of Brussels, in detailing unusual observations made, refers to the occurrence at Silverdale (Hawswater Lake) of the following alpine or subalpine plants:—*Selaginella spinutosa*, *Pinguicula vulgaris*, and *Primula farinosa*. His attention was also attracted by wide-spreading sheets of *Rhacomitrium lanuginosum* (already referred to in the *Lancashire*

Naturalist) on Cross Fell and Ben Lawers. He comments on the great similarity between the Flora of the Southport sand-dunes and that of Belgium. Also he gives as features worthy of special mention, the thickets of Yew on the Silverdale limestone, and the presence thereon of such calcifuge species as *Pteris* and *Calluna*—features to which prominence is given in the *Flora of West Lancashire* (1907).

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The recent introduction of the allantoin of the Comfrey as a new cell proliferant in the treatment of disease, has led to considerable correspondence in the medical journals. In the *British Medical Journal* for February 10th, Mr. P. H. Marsden refers to the common name of Comfrey in Lancashire as "bone-set" or "knit-bone," which he suggests may have been handed down from the time of the Saxons. He gives references to 21 works in which the medical virtues of Comfrey are discussed. Dr. Hardman, of Blackpool, speaks of the distribution in the Fylde of *Symphytum officinale* and *Borago officinalis*. He says "the common Comfrey is decidedly not common in the Fylde . . . . . but Borage, where once it becomes established, is a very prolific weed." In our experience the Comfrey is much the more widely spread plant in Lancashire, and often appearing to be truly wild; whereas Borage is practically unknown, except as a mere impermanent garden outcast.

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The Naturalist for February has a supplementary article on "The Boring Habits of the *Pholas*," this by John Irving, M.D. An interesting survey of the whole question of boring took place at a recent joint meeting of the Leeds and Manchester branches of the Conchological Society. E. Chas. Horrell contributes "The Beetles of the Scarborough District"; C. F. George M.R.C.S. deals with a new British mite, *Bdella hexophthalma* Gervais; and W. Wilson has some "Notes on the Fæces of Young Birds."

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At a meeting of the Linnean Society on Feb. 1st, the Rev. R. Ashington Bullen, F.L.S., exhibited a snail found by him at Porto Pi, near Palma, Mallorca, in March, 1909. This had a shell of composite characters allying it on the one hand to *Helix aspersa* O. F. Müll, and on the other to *Otala vermiculata* (O. F. Müll.), both common Lusitanian forms. The Rev E. H. Bowell having examined the anatomy of the animal itself, found that its radula partook of an intermediate character, showing affinities to the species named, and the absence of certain organs argued its hybridity.

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The Passing Hour.

The death is announced of Professor Osborne Reynolds, who was for a period of thirty-seven years associated with Owens College and the Manchester University, this occurring on Feb. 21st at Watchet, Somerset. A chair of engineering was founded at Owens College in 1868, the first chair of its kind in the United Kingdom, and Professor Reynolds was the first to be appointed to it, resigning the position in 1905. He organised and arranged the Whitworth Laboratories. He was the author of over seventy papers on original researches in mechanics and physics, and these were published in volume form. Of his works "Sub-Mechanics of the Universe," the result of a quarter of a century's study, holds the most prominent position. He was made a Fellow of the Royal Society in 1877, and a Member of the Institute of Civil Engineers in 1878. In 1884 he had conferred upon him the honorary degree of LL.D. of the Glasgow University, and was later appointed a member of the Council of the Royal Society. Afterwards he became a sectional president, and received the gold medal of the Society. Prof. Reynolds had been for upwards of forty years a member of the Manchester Literary and Philosophical Society.

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On the day following another ardent worker passed away in the person of Dr. A. H. Young. Dr. Young became demonstrator and assistant lecturer in anatomy at Owens College in 1877, and was afterwards appointed to the position of Dean of the Medical School, and became Professor of Anatomy in the Manchester University, retaining the chair till 1909, when he resigned through ill-health.

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In spite of all the suggested terrors of "Escargots de Bourgogne," the Manchester Conchologists appreciated their visit to Leeds and the opportunity of renewing the good-fellowship which is rapidly drawing the two branches closer and closer together. These joint meetings must have a beneficial effect, and lead to a perfect understanding and appreciation of each other's work. In East Lancashire it is customary to initiate new ramblers by inducing them to taste the leaves of the Cuckoo-pint. Mr. Cash on this occasion humorously referred to the new dish introduced as the "Conchological baptism."

NOTES, QUERIES, AND RECORDS OF FIELD WORK.

Stone Crosses.

[To S. J.]—The paper you mention was one read by Mr. W. H. Sutcliffe, F.G.S., to the members of the Rochdale Literary and Scientific Society in 1892. Referring to "The Long Causeway" he says :—

"On an ancient road called 'The Long Causeway,' leading from Burnley in the direction of Halifax, there were erected quite a number of crosses.

"I. *Burnley Cross*, which still exists in a fair state of preservation.

"II. *Stump Cross*, of which a veritable stump remains . .

"III. *Robin Cross*. This has entirely disappeared, but a neighbouring hill still bears the name of Robin Cross Hill.

"IV. *Maiden Cross*. . . All that is left of this cross is a plain slab of millstone grit built into the wall on the roadside, but we have a Maiden Cross Coal-pit close to hand.

"V. *Duke's Cross*—also disappeared. . . . . .

"VI. *Stiperden Cross* is named after the *steep dene* close to which it stands. This is late Norman in character, carved out of one block of millstone grit. It stands 6ft. 6in. high out of the ground, and is 12in. wide by 9in. deep. The cross faces east and west and has similar carving on both sides. . . . .

"VII.—*Cross Stone*—the last of this series of crosses. In documents dated 1640 it is called Stone Cross ; we may therefore take it for granted that a cross stood here. In later documents the name is variously given as Stone Cross or Cross Stone. At the present time the probable site is occupied by Cross Stone Church."

Mr. Sutcliffe does not uphold the idea that this line of crosses led from Whalley Abbey to Kirkstall Abbey, but believes that they were set up by the Lacies themselves to mark the line of road on the old pack-horse tracks, one of which still exists between Stiperden Cross and Cross Stone Church just below Bride Stones.

We should be very pleased indeed to publish notes on these old crosses or on kindred subjects of antiquarian interest.

LIVERPOOL BOTANICAL SOCIETY.

The sixth annual Soirèe of the Liverpool Botanical Society was held on the 17th of February in the Church Hall, Hope Street. Although for the nonce the more scientific activities of the Society were supposed to be in abeyance, there was a decidedly botanical flavour attached to the recreation provided by the Soirèe Committee, under the able secretaryship of Mrs. Wheldon. A plant-naming contest elicited a spirited competition, the first prize being won by Mr. C. Waterfall, F.L.S., Miss White proving his most formidable opponent. The identification of a number of fruits, and their correct botanical terminology, proved a more difficult test, the prize winners being Messrs. Waterfall and Sibbald. Much amusement was caused by the "Cryptodores," or bottled "flower scents," the ingenious character of which did much credit to Mr. Dallman, who prepared the enigmas for solution. Miss Delaney carried off the trophy, which was, very appropriately, a bottle of perfume. The floral decorations were supplied by Mr. Dallman and Mrs. Stephenson, the celebrated roof-garden of the latter lady contributing some delightful gems of flower and foliage. Mr. Waterfall exhibited many interesting plants, representing various geographical and ecological groups of species, which proved both interesting and instructive. In the Library, an exhibition of microscopic objects, provided by Mr. W. T. Haydon, F.L.S., gave glimpses of the lower forms of vegetable life, many of the objects being living and moving. There were also sections, with descriptive notes, explanatory of the minute structure of plants.

These various features, however, were only accessories. The main object of the Soirèe has always been the promotion of a spirit of *camaraderie* amongst the members, it being justly held that this kindly feeling should be encouraged as being eminently conducive to the welfare and efficiency of the Society.

The guests were received by the President and Mrs. Haydon, and after a brief address delivered by the former in his usual racy and genial style, the proceedings took the form of a concert in which Miss Doris Wheldon, Miss Dinah Delaney, and Miss Mabel Stocks discoursed sweet music, and Mr. Frank Kinlay supplied the humour in the form of a burlesque lecture.

After a long interval for refreshments, conversation, and competitions, the concert was resumed, Mr. J. A. Wheldon, F.L.S., taking the chair, owing to the President having to leave early. In this half of the programme music and song were provided by Mr. Fred Evans and Miss Stuart, Mr. Frank Kinlay delivering a highly diverting musical monologue. The songs were accompanied by Miss Weir and Mrs. Wheldon.

A delightful evening was spent, new friendships made and old ones cemented, and the success of this re-union augurs well for the prosperity of the Society during the session just commencing.

NOTES ON A REMARKABLE WATERWAY.

By "Nemo."

(Continued from page 276.)

Serious indisposition has prevented me from working up the conclusion of this article as I had originally intended, and I must leave the bulk of my notes to be issued in another form at some future time. To those who have not yet seen much of the districts bordering upon this notable canal, I should say, do so at the first favourable opportunity. Along its course are to be seen some of the most delightful bits of picturesque West Lancashire. There is little or no pollution in the greater part of its water, and it is the least defiled of all our northern waterways. No large warehouses hug its banks for miles, and there are few manufacturing industries to pour pollution into it. The result is that vegetation grows apace, and the gaugers, or canal watchers, are constantly employed in dredging. On some of the lengths are to be found many basins which present fine covert for wild life, and these are taken full advantage of, as well as the ditches which flank the east bank near to Garstang. Of many of these features I propose to treat at a convenient time. To one phase that struck me as peculiar I may refer, and that is the comparative rarity of the Magpie in some of the districts. To me, used to seeing this bird at all times, it was surprising to find it so little known. One day I was called to a house to see a bird that had been newly shot. My conductor asked me what I thought the bird would be from his description of it. "A Magpie, surely," I replied. And a Magpie it turned out to be. But it was so long since many of them had seen the bird that they who had shot this one did not care to express an opinion upon its name.

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MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY.

On Feb. 6th, at a meeting of the Society, Mr. T. A. Coward exhibited a living specimen of a Wall Gecko (*Tarentola mauritanica*) captured at Broadheath on January 22nd, and gave a brief account of its food and habits.

A communication was made by Mr. William Burton on the earliest industrial use of platinum. The general history of platinum, its introduction into Europe from South America, and its recognition as a noble metal is carefully abstracted in many works. Small supplies of native platinum reached Europe between 1740 and 1770, but it was not until 1784 that Achard prepared the first rudimentary platinum crucible. The first development of the metallurgy of platinum originated in England —at the hands of Johnson, Matthey and Co.—but this was only from 1800-1808. A decree of the Spanish Government that platinum should be thrown into the sea, as its only known use was to adulterate gold coinage, is given as a reason for the scarcity of platinum in Europe during the latter half of the eighteenth century. However, in 1788, the Spanish Government, presumably to depreciate the gold coinage on its own account, suspended the edict, and began to buy platinum in South America at the rate of 8s. per lb., and within twenty years the manufacture of platinum wire, foil, and apparatus was established in England. The history of the use of platinum by potters was given, and an account of the methods they employed. He exhibited various specimens of wares coated with platinum, gold, silver, and other minerals. It was mentioned that the present price of platinum is very high.

Professor Rutherford read an important scientific paper entitled, "The origin of Beta rays from radio-active substances."

At a meeting on February 20th, Mr T. G. B. Osborn gave a short account of recent investigations into the nature of the moulds which attacked exported cotton goods, several common Fungi and Bacteria having been found infecting such goods. Mr. Francis Nicholson and Mr. R. L. Taylor joined in the discussion.

Professor W. H. Lang, F.R.S., read a paper entitled "Branching in the Ophioglossaceæ." The Ophioglossaceæ, including our British Adder's Tongue Fern and Moonwort, were a group of plants the affinities of which have been much disputed. Various features in their anatomy appear to point to

a relationship with extinct ferns belonging to the Botryopterideæ. The branching in the Ophioglossaceæ has been very imperfectly studied, and Professor Lang dealt with cases of branching in *Botrichium lunaria* and *Helminthostachys zeylandica*. In *Botrichium* the vascular supply to the branch comes from the inner side of a leaf-trace on its way through the cortex. This relation of the branch to the parent stem is similar to that found in *zygopteris*. In *Helminthostachys*, on the other hand, the supply to the branch comes from the vascular system of the stem, although the branch stands in a similar axillary position. In both these genera a dormant bud is present in the axil of each leaf, so that the branches are not adventitious, but arise under special conditions from this bud. In the cases studied the development of the branch was connected with the arrest of growth of the parent stem. The study of the branching strengthens the comparison between the Ophioglossaceæ and the Botryopterideæ.

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LIVERPOOL GEOLOGIGAL SOCIETY.

At the Royal Institution, on 13th February, a lecture was delivered by A. Wade, D.Sc., A.R.C.S., F.G.S., on "Glacial Lakes along the Welsh Border," embodying observations made during a recent geological survey of north-eastern Montgomeryshire, whose structural and stratigraphical features have been described by the lecturer in a paper lately published by the Geological Society of London.

After a brief sketch of the physiographical features of the district, Dr. Wade referred to a number of abnormal drainage features presented by "misfit" and "beheaded" streams, reversed courses, and "drv notches." These phenomena, together with the presence of well-marked horizontal terraces at varying elevations found along the Vale of Guilsfield and the Severn Valley in the neighbourhood of Welshpool, find a satisfactory explanation in the fact that during the Glacial Period the mouths of the valleys were blocked by a barrier formed by lobes of the northern ice-sheet by which the normal drainage became impounded, giving rise to lakes the overflows of which passed over cols in the ridges. On the removal of the glacial obstructions during ameliorated climatic conditions, the lakes were gradually drained, leaving as relics dry notches and gorges to indicate their overflow channels, together with terraces of *dèbris* which had accumulated along the lake margins. The lecturer pointed out several examples of river-capture, and concluded by a description of the evolution of some of the rivers. The lecture was illustrated by maps and lantern-views.

A KEY TO THE BRITISH AGARICINEÆ.

By H. J. Wheldon.

(Continued from page 372.)

Panæolus Fries.

The species are often prevalent in rich grassy places or on dung. The pileus does not become expanded, and the edge extends beyond the gills, which are usually slate-black mottled with black spores. The veil often remains appendiculate.

A revision of this genus seems necessary, as there is so much variation amongst even single species as at present understood.

1 { Pileus *with a darker marginal zone*, not viscid - - 2
Pileus not zoned, nor viscid (but often moist) - - 6
Pileus not zoned, *viscid* - - - - - - - 5

2 { *Conical*, 2cm., pinkish-buff, shining ; stem 3cm., fuscous below. On dung, roadsides *P. acuminatus* Fr.
Pileus campanulate, obtuse - - - - - - 3

3 { Grey then yellowish, 2cm., *stem whitish* - *P. fimicola* Fr.
Stem reddish- or dingy-brown - - - - - - 4

4 { Dull fawn, *subwrinkled*, 3-5cm.; stem red-brown, white-fibrillose. Cæspitose ; in fields *P. subbalteatus* B. Br.
Reddish-cinnamon, 6cm., even ; stem dingy fuscous. Dunghills (July) - - - *P. cinctulus* Fr.

5 { Whitish, satiny, 2cm.; stem *white*, mealy. *P. leucophanes* B.Br.
Whitish-clay, 2-5cm.; st. tan-rufescent *P. phalænarum* Fr.
Orange-brown, ovate, 5cm.; stem brownish *P. egregius* M.

6 { Fleshy-tan, 2-3cm., *with net-like raised ribs*, stem purplish - - - - - *P. retirugis* Fr.
Pileus without raised ribs - - - - - - - 7

7 { Obtuse 1-2cm., brown; stem same, naked. *P. caliginosus* Fr.
Without these characteristics - - - - - - 8

8 { *Hemispherical*, 2-3cm., greyish or tinged tan, *stem whitish, apex white mealy* - - *P. papilionaceus* Fr.
Parabolic, 2cm., smoky-grey, drying livid ; *stem sooty-grey* - - - - *P. sphinctrinus* Fr.
Campanulate, 2-3cm., smoky-fuscous or greyish ; *stem rufescent, apex striate, powdered* *P. campanulatus* Fr.

Panus Fries.

Allied to *Lentinus* in the tough substance, but differs in the margin of the coriaceous gills being *quite entire*. Growing on trunks; often cæspitose.

1 { Pileus irregular ; stem excentric, cæspitose - - 2
Stem lateral. Pileus reniform, often imbricate - - 4
Pileus resupinate, sessile, or produced to a point of attachment behind - - - - 5

2 { Reddish-ochre, or tan, 4-6cm., *bristling with hairs*, gills *crowded*, pale buff. *Fragrant*. *P. rudis* Fr.
Without bristling hairs, 3-9cm., depressed - - 3

3 { Cinnamon, flaccid, thin, gills pinky-ochre *P. conchatus* Fr.
Buff or brownish-yellow, more fleshy ; gills reddish-tan, stem grey-downy - - - *P. torulosus* Fr.

4 { Cinnamon to pale, white furfuraceous, 2-4cm.; drying wholly orange ; *taste astringent* *P. stypticus* Fr.
Dusky cinnamon, 1-2cm., grey scurfy **P. farinaceus* Fr.

5 { Umber to buff, edge white, 2cm.; g. ochre. *P. patellaris* Fr.
Olivaceous yellow, spathulate - *P. Stevensonii* B. & Br.

* *var. albido-tomentosus* C. & M. Clad with whitish down.

Paxillus Fries.

Pileus at first strongly involute at the margin ; gills easily separable from the flesh of the pileus. Growing in woods and fields, sometimes on wood. The first sub-genus is allied to *Clitocybe*, the second to *Flammula*.

1 { Spores dirty white or *faintly* ferruginous ; gills crowded ; pileus entire, central (sub-genus *Lepista*) - 2
Spores *ferruginous* ; stem more or less excentric, or obso'ete (sub-genus *Tapinia*) - - - 8

2 { Margin of pileus sulcate or striate - - - - 3
Margin of pileus not striate - - - - - 4

3 { 10-25cm., infund., whitish or tinged tan, *sulcate ;* stem stained faintly vinous - -*P. giganteus* Fr.
4-7cm., plano-depressed, fawn, stem same. *P. Alexandri* Fr.
2-9cm., campan. obtuse, brownish or clay, stem same, tuberous-rooting - - *P. extenuatus* Fr.

4 { 2-9cm., *brownish-tan*, g. very decur. (see 3) *P. extenuatus*
Pale ochreous, convex, 2-4cm. - - - - - 5
Whitish or tinged yellowish - - - - - 6

5 { Gills *subdecur, white*. In small clusters - *P. lividus* Cke.
Gills *deeply decur. clay colour* ; margin at times lilac, a little upturned - - - *P. revolutus* Cke

6 { Dingy white, 4-9cm. ; stem stout ; g. *very decur. whitish*. Smell rather rancid - - - *P. lepista* Fr.
2-4cm., white or spotted grey ; g. *subdecur. brownish-* 7

7 { Flesh becoming blackish ; stem attenuate upwards ; spores subglobose, 5*u* - *P. panæolus* Fr.
Stem attenuate to base ; sp. oval, 8 x 4 *P. orcelloides* Cke.

8 { Dimidiate, 4-8cm., *stemless* ; g. decur. to base, crisped 9
Stem excentric (rarely lateral in *P. atrotomentosus*) - 10

9 { *Conchate*, imbricate, dull yellow ; *g. ochreous. P. panuoides* Fr.
Pallid, becoming revolute, crisped ; *g. orange. P. Fabi* B. Br.

10 { 10cm., reddish-brown, not involute ; gills decur., *poriform, yellowish to blue then dull green*, brownish if bruised. Odour strong - - *P. porosus* B.
Without these characteristics - - - - - 11

11 { Densely *tomentose*, deep *rufous-umber* or purplish ; gills distant, *yellow*, bruising reddish..*P. paradoxus* B.
Pileus ferruginous or yellow-umber - - - 12

12 { 6-12cm., stem *equal*, with dense *black-umber tomentum* ; gills yellow. Odour strong..*P. atrotomentosus* Fr.
Without these characteristics - - - - - 13

13 { 7-15cm., strongly involute, margin villose ; gills poriform at base, darker if bruised - - *P. involutus* Fr.
4-7cm., subinvolute ; stem *short, attenuate to base* ; gills not spotting when touched nor anastomosing 14

14 { Pileus downy ; gills yellow ; spores 8-9 x 5 *P. leptopus* Fr.
Gills subdistant, cinnamon ; sp. 15-15 x 7-8 *P. crassus* Fr.

Pholiota Fries.

The only genus in the *Ochrosporæ* having a persistent interwoven ring ; *Flammula* and *Cortinarius*, allied genera, have only a fibrillose zone at the most.

In 1908 W. G. Smith separated the terrestrial species, and placed them under a new generic name, *Togaria*, which is analagous with *Lepiota* and *Psalliota*. It follows that all the species of *Pholiota*, as amended, grow on trees and stumps (except *P. pumila* and *P. mycenoides*, which occur amongst moss) ; they are often densely cæspitose and brilliantly coloured.

1 { Terrestrial, especially under trees - - See TOGARIA
Hygrophanous, small, 1-2cm. ; growing amongst moss, &c. 2
Mostly larger and cæspitose on trunks and stumps - 3

2 { Ochre, edge substriate ; ring floccose *P. pumila* Fr.
Rusty-tawny, *striate* ; ring persistent *P. mycenoides* Fr.

(To be continued.)

NOTES ON SOME RARE COLEOPTERA TAKEN DURING 1911.

BY J. RAY HARDY.

It may be interesting to place on record the occurrence of some species of beetles rarely, if ever, met with in the North of England, which have been taken either by myself or friends.

Crepidodera transversa Marsh.

I consider that one of the most interesting captures of the year was a melanic specimen of this species, which I swept off a species of *Mentha*, at dusk, July 28th, close to Cuddington Station, Cheshire. The contrast between this jet black specimen and the well-known rusty-red colour of the type is very striking. I have submitted the specimen to some of our chief authorities, and they agree with me as to its being a true melanic form of the species.

Megacronus inclinatus Gr.

This species, which is not common anywhere, I took for the first time in Cheshire, on May 11th, one male in Delamere Forest, shaken out of oak leaves.

Gymnusa brevicollis Pk.

Several examples of this extremely local insect were shaken out of Sphagnum by Messrs. Gartside and Ford, and myself, on July 11th, in Delamere Forest. This is, so far as I know, its first recorded occurrence in Cheshire.

Pseudopsis sulcata New.

Three examples of this curious and rare little beetle occurred amongst dead ferns in Delamere Forest, on July 11th. This is the first time I have observed this species in Cheshire, and have not heard of any previous occurrence.

Sphindus dubius Gyll.

I picked a nice male specimen of this scarce species out of a number of *Cis boleti* collected by Mr. Gartside, in fungus off a dead oak, in Delamere Forest, on July 11th, and this he very generously allowed me to retain for my own collection. This is the first Cheshire record.

Phlœophilus edwardsi Step.

Four specimens were taken by me under bark of Sycamore in Delamere Forest, and three others by Mr. Gartside, on July 11th. This is, I believe, its first recorded occurrence in Cheshire.

Orobitis cyaneus Lin.

I swept this curious seed-like beetle from *Viola canina* on roadside, between Cuddington and Delamere, on July 11th. Four specimens.

Ceuthorhynchus viduatus Gyll.

Swept off Deadnettle, Delamere Forest—one by Mr. Gartside and four by myself—on June 11th. I am unaware of any previous records for the county.

Anthocomus terminatus Mén.

One example of this rare insect—which I consider my best catch of the year—was taken by Mr. Gartside, and brought to me to name, on July 13th. At first I thought it might be a variety of *A. fasciatus*, which is not uncommon near Bowdon, but on careful examination it proved to be the much scarcer *A. terminatus*. On the following day I myself visited the locality—a Sphagnum bog in Delamere Forest, and a long day's search resulted in the capture of another fine specimen. I am of opinion we were too late in the season, and that earlier search might have better results. The species has not, according to Fowler, occurred hitherto in the North of England, its habitat being the Fens.

Staphylinus fulvipes Scop.

Mr. Gartside captured one fine male, behind Delamere Station, shaken out of moss on the roadside, on June 9th. This specimen he has presented to the Manchester Museum.

Prognatha quadricornis Lac.

I took three specimens of this from under bark of felled pine trees near Delamere Station, July 11th. I have not previously met with this insect further north than Sherwood Forest, and Fowler states that it has never been recorded for the North of England, or Scotland.

CONCHOLOGICAL SOCIETY OF GREAT BRITAIN AND IRELAND.

The last meeting was held in the University at Leeds, when the members of the Manchester Centre paid a return visit to their Leeds brethren. It was a small but happy party that made the journey from Manchester. The day was beautifully fine, and as the railway ride lengthened out, many were the wistful glances cast out upon the sunlit hills and valleys as they passed tortuously along. There was some compensation in the warm greeting from Bradford friends when Leeds was eventually reached.

The President of the Leeds Branch was unfortunately absent through illness, a cause which interfered with the attendance of other prominent members of both Branches. The Vice-president, Prof. W. Garstang, M.A., D.Sc., presided, and gave a hearty welcome to the visitors.

Those present included Messrs. E. Collier, J. W. Jackson, F.G.S., G. H. Taylor, W. H. Western, H. Allan, C. R. Moore, E. R. Brown, Manchester; Messrs. J. W. Taylor, W. Denison Roebuck, F.L.S., Wm. Cash, F.G.S., W. Bagshaw, F.R.M.S., J. E. Crowther, W. Hutton, T. Castle, F. Rhodes, J. Digby Firth, F.L.S., F.E.S., G. Fisher, J. F. Musham, F.E.S., T. Stringer, H. L. Stephenson, W. Withell, C. T. Cribb, W. Hewett, F.E.S., and F. Booth (hon. sec.), Leeds; Mr. J. A. Hargreaves, Scarborough.

The afternoon meeting, held at the University, was given over to a combined display of *Hygromia* (*Fruticicola*) *rufescens* (Pennant), with remarks on the species by Mr. J. W. Taylor, who said the genus *Hygromia*, of which perhaps *H. hispida* is a fairly representative species, is characterised by a somewhat globose or globosely compressed shell, with a dull, uniformly coloured epidermis beset with numerous and orderly-arranged projecting hairs or bristles, and a slightly angulate or rounded periphry, though always more or less carinate when young.

The species under consideration has a depressed shell with six or seven whorls, which, though sharply keeled in the juvenile stages, are at maturity slightly angulated, the aperture is semi-elliptical, and slightly reflected, with a broad internal submarginal thickening which is perceptible through the substance of the shell; the umbilicus is distinct and open but not wide. In the young state the shell is frequently hispid, and in this state is liable to be confounded with *H. hispida*.

This species was first noted in 1674 by our famous countryman Dr. Martin Lister, who applied to it the curious polynomial designation, "*Cochleu dilutè rufescens, aut subalbida, sinu ad umbilicum exigus circinata,*" in the approved method of the period, but it is to Dr. Pennant we are indebted for its binomial designation, *Helix rufescens*, a name which he applied in his "British Zoology" published in 1777.

After giving an exhaustive account of the physiology of the animal and the reproduction of this species, Mr. Taylor said, as indicated by the generic name, this group lives in moist situations, although the characters imprinted on the shell indicate a relinquishment, to some extent, of the typical habits of living in the deeper recesses of shady woods, for a comparatively more open country, which implies a greater variety of environment and should confer greater powers of accommodation or adaptability. They have been collected in a variety of situations, as on the margin of woods and groves, in gardens and meadows, in hedgerows, under moss and dry vegetation or sticks and stones, amongst nettles and ivy. They have been noticed to infest plum and apricot trees, and are frequently found under the leaves of violets and primroses in gardens, upon which plants they doubtless feed, and also show a taste for the petals of the cultivated poppies. It is especially noted as plentiful on chalk or limestone soils and as a pest in gardens.

Its enemies are numerous, for in addition to the usual enemies of *Helices* generally, the Thrushes are very fond of it, as instanced by the number of broken shells at Thrush stones, while nestlings of the Stock-Dove have been noted with their crops filled with examples of this species. The domestic fowls, even when well-fed, seem delighted to pick them up as dainty morsels. The species is not known fossilised below the Pleistocene beds, and is known to exist in those of Germany, France, Holland, Belgium, Austria, Moravia, Silesia, etc., and in England has been recorded from the deposits at Clapton and Copford, in Essex. Though undoubtedly found in nearly all the Holocene beds on the Continent, there are very few records for Holocene fossils made abroad, but in England it is already known as found in those of Kent, Surrey, Middlesex, Hampshire, Wiltshire, Westmorland, &c.

The specific limits of this species have not yet been authoritatively and satisfactorily fixed, and therefore the true variations cannot yet be determined. The variation of the species is not very great, and consists of a limited degree of

modification in colouring, in size, and shape, while he was given to understand that this species in certain parts of Ireland blends insensibly with *Hygromia hispida*, and this is not surprising, for the structural differences of the two forms are very slight. *H. rufescens* is a comparatively recent offshoot from the stem of the typical *H. hispida*, and in a comparatively weak country like Ireland, one is more likely to meet with the earlier members of a species, than amongst most dominant surroundings, where less vigorous forms are more rigorously exterminated. *H. rufescens* has probably arisen from the *hispida* stem by relinquishing the moist umbrageous resorts of the typical forms of the genus, and is clearly diverging therefrom, showing a shell of brighter colours, a thinner epidermis, hirsute only in its youthful stage, and a thicker calcareous base, all of which bespeak a species which careful study shows to have betaken itself to a life in a more exposed and drier ground than the *hispida* section usually inhabits. From a thoughtful study of the shell alone we can thus glean something of the course of the development of a species by the characters impressed on the shell itself, in its mature and juvenile condition, and although essential modifications of the internal structure have not yet been evolved, as before pointed out we are not in a position to appraise the significance of the slight differences that are noticeable.

The variation in the colours of the shell are of exceeding interest, and in the var. *albocincta*, which is an atavic form and represents the vestigial remnants of a former more brilliant scheme of coloration, which is attested by the whitish and more calcified peripheral zone which represents the interspace between the upper and lower group of bands of the ancient pigmentation. The wide distribution amongst several but little related genera of this reminiscent colouring, is an evidence of the wide prevalence of a similar system of banding among their remote ancestors, and points to a more generalised type, from which they have been derived and diverged. These vestiges of ancient pigmentation disclose the fact that the ancestors of the *Hygromia* were more ornate species and lived in more open but not arid situations, but evidently were compelled or voluntarily entered upon a more secluded mode of life, and lost the probably varied surface pigmentation, becoming uniformly brownish in accordance with the moister and deeper shaded environment to which they resorted. The predilection of this species for living in less shaded and open places will inevitably result in the evolution of a different scheme of colouring or ornamentation as has been the case in the genus *Helix*. Though a widely dispersed form,

it is more common, as would be naturally expected, in the weaker West of England than in the more modern eastern side.

The white form (var. *alba*) is also well distributed, as is also the deeper coloured reddish-brown form (var. *rubens*). Varieties in form of shell are known by the names *depressa*, *subcarinata*, *montana*, *globosa*, and *danubialis*. Perhaps one of the most interesting varieties is that known as var. *clessini*, which is a remarkable atavic form in which the hairy periostracum proper to its very young stage is retained to adult life. It is noticed as found amongst moist decaying leaves in South Bavaria. The varieties in size have been distinguished as vars. *major* and *minor*. Other varieties have been noted but not authoritatively named, in regard to substance of shell. There are also scalariform specimens known as *scalariforme* and *subscalaris*, and also a sinistral form known as *sinistrosum*.

The geographical distribution of this species is not well-known, as the identity is so greatly confused on the Continent with those of other closely allied species, but it probably ranges over the northern part of the palæarctic region, as it is known over Central Europe, including Germany, France, Switzerland, Austro-Hungary, Belgium, Holland, Denmark, Sweden, Spain, and North Italy, and is also recorded from Central and Eastern Asia at Irkutsch and Amur district. In the British Isles, with some curious exceptions, it is diffused over Ireland, England, and Wales, and extends more or less sporadically in Scotland, chiefly on the west coast, reaching as far as the Great Rift Valley, which extends from Moray Firth in the east to Loch Linnhe on the west. It has been artificially introduced into the extreme north of Scotland, where it appears at latest accounts to be flourishing and likely to extend its range. In the United States and Canada, where it has also been introduced, it is apparently thriving, and especially about Quebec, it is very abundant and widely dispersed.

At the close of Mr. Taylor's remarks, which were highly appreciated, the members adjourned to tea at the East Parade Cafe. For one of the dishes towards an excellent repast the members were indebted to Mr. A. H. Pawson, F.L.S , F.G.S., who resides in Oxford. This was staged under the pseudonym of "Escargots de Bourgogne," otherwise cooked Apple Snails (*Helix pomatia*), and was pronounced by most of the members present an estimable surprise packet.

Mr. Wm. Cash, F.G.S., in proposing the members' thanks to Mr. Pawson for his kindness, commented most humorously on the novelty of the dish, and considered it took the position of a kind of conchological baptism.

After tea the meeting was given over to varied exhibits, with comments by the exhibitors, and the following members exhibited interesting and varied objects :

Mr. J. E. Crowther : A large series of *Limnæa stagnalis* from various localities to show wide diversity in form of shell.

Mr. W. Hewett, F.E.S.: an abnormally large specimen of *Planorbis corneus* from Strensall Common, York.

Mr. J. W. Jackson, F.G.S.: Byssus of *Pinna* (a marine shell), and a glove made from the spun silky fibre of which the byssus is formed, from Italy. Also *Pupa secale* from Penrith and *Pisidium amnicum* from Hale, Burton-in-Kendal, Westmorland.

Mr. J. F. Musham, F.E.S.: *Helix nemoralis* with umbilicus from Lincs., and a small collection of Maltese land and marine shells.

Mr. E. Collier : *Paludestrina jenkinsi* from the Canal at Leicester.

Mr. F. Booth : Species of land shells from British East Africa.

Some discussion took place on the boring habits of *Pholas*, initiated by Mr. J. A. Hargreaves, of Scarborough, who said he was convinced in his own mind that the movement of the shell alone, as had been stated, was not responsible for the cavities made by this genus, and looked towards the foot for a probable solution. He instanced the fact of *Saxicava* boring for itself cavities in rocks, a species whose shell was of a far softer character than that of *Pholas*, and without the corrugations. He considered the *modus operandi* in this case, whatever that might be, would be applicable to that of *Pholas*.

Other members took up the discussion, which, while it was interesting and instructive, was productive of no tangible result.

Votes of thanks brought to a close a memorable meeting, and Mr. Collier emphasised the thought in the minds of all present when he said he wished these joint meetings occurred oftener.

REFERENCE LIBRARY, SALFORD, PEEL PARK.

NOTES FROM GRANGE DISTRICT.

Whilst on a visit with two friends to Grange-over-Sands in August of last year, more on pleasure bent than on any active natural history investigation, the following species of Coleoptera were collected at the foot of Meathop Fell. All are additions to the small list which appeared in this Journal for October, 1909. We were delighted to come across our friends Mr. R. Standen and Mr. J. W. Jackson, who were staying there, and had the pleasure of their company during the afternoon, which was spent at Meathop Fell in divers pursuits. Numerous species of Arachnida were also secured, but as these have not yet been determined I cannot append a list at present. I am indebted to Mr. J. W. Carter, F.E.S., of Bradford, for kindly identifying the Coleoptera.

Leistus fulvibarbis Dj.
Badister bipustulatus F.
Loricera pilicornis F.
Calathus melanocephalus L.
Anchomenus parumpunctatus F.
Bembidium lampros Hbst.
Ocypus ater Gr.
Coccinella 11-punctata L.
Otiorrhynchus scabrosus Marsh.
Sitones flavescens Marsh.
Lema lichenis Voet.
Longitarsus luridus Scop.

F. Booth.

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THE CONSUMPTION OF COAL DUST.

On Feb. 13th, Mr. Hugh V. Hart-Davis read a paper before the members of the Manchester Geological and Mining Society dealing with coal dust, which, he said, constituted one of the many difficulties with which mining engineers had to contend. Much had been done and was being done towards collecting the dust below ground, but at few mines were any steps taken to gather the material on the surface. Up to the present the use of pulverised fuel was limited to the burning of cement in special kilns, no commercial success having been established in its use for firing boilers. A plant that had successfully overcome difficulties had been erected at the Outwood Collieries, near Radcliffe. This was described by Mr. Davis, who concluded that it was possible to efficiently consume coal dust, a fuel that had hitherto been considered as waste material, and had hitherto found its way to the colliery refuse heap.

LANCASHIRE AND CHESHIRE ANTIQUARIAN SOCIETY.

At the February meeting of the Lancashire and Cheshire Antiquarian Society, held at the Chetham Hospital, the President, Mr. A. Nicholson, referred to the death of Mr. George Pearson, a president of the Society in 1905, and who had been a vice-president continuously since that time. A vote of condolence with the deceased gentleman's widow was unanimously passed.

The exhibits included a stone implement of adze-like form, but broken across the haft-socket section. The material is a hard, fine grained sandstone of a very light grey colour. It was found in 1911 at Heaton Mersey in digging for clay at the brickworks of Messrs. Peter Bailey and Sons. It lay in grey sandy soil about two feet below the surface Another large stone implement of a long axe-shaped, but rather unusual type was shown by Miss Leech. It had been found some years ago at Clayton-le-Moors, but further particulars would be obtained later. Alderman Fletcher Moss showed a bronze tripod which was pronounced to be of French make.

A short communication was read by the honorary secretary which had been received by Mr. Henry Taylor on the restoration of the Foldys Cross at Burnley which had been carried out at his suggestion. Mr. Taylor also gave some interesting information relating to the former islands of Martin Mere.

In a paper on Warden Huntingdon's rebus in Manchester Cathedral, the Rev. Henry A. Hudson, M A., described the curious fashion prevalent in the fifteenth and sixteenth centuries of representing names by means of a pictorial cipher called the rebus. The custom, which is said to have been derived from the French, is illustrated not only in architecture, where the rebus is found carved in stone and wood and painted on glass, but also in the books and title pages of the printers of the period. When John Huntingdon, the first warden of the college founded in Manchester by Thomas la Warr in 1421, built the new chancel of the Collegiate Church he had his rebus set up in two spirited carvings in the spandrels of the roof beam immediately behind the chancel arch, where it still remains. Evidence was given from documents of the seventeenth, eighteenth, and early nineteenth centuries, and from an architectural drawing by John Palmer dated 1830, to show that this was the only rebus known until the middle of the nineteenth century, when a replica of inferior artistic merit was set up first

in stucco and later in stone on the east wall above the entrance to the Lady Chapel. The object of the paper was to refute a common error which regards the latter as the warden's handiwork, and to show that no value whatever can be attached to arguments which adduce it as evidence of ancient structural history.

Mr. W. J. Andrew, F.S.A., sent a paper on "The Excavation of a Tumulus on Sponds Hill, East Cheshire," which, in the absence of the author, was read by the hon. secretary, and the progress of the work explained by diagrams. Mr. Andrew places the period of the tumulus as belonging to the Early Bronze Age, possibly 1200 B.C.

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At a meeting of the Linnean Society, on Feb. 1st, the Rev. R. Ashington Bullen exhibited new engravings, enlarged 12 diameters, of *Hygromia montivaga* Westurlund. This land mollusc was found at Harlyn Bay, Cornwall, in a prehistoric cemetery of late Keltic date in 1902. He had found about 40 specimens in all. It is a member of the Lusitanian fauna, and, so far, only found in England in the above locality. The exhibitor adduced evidence to show that it was certainly of pre-Roman date (early Iron Age), having occurred in a probably Pleistocene horizon in previously undisturbed brown sandy clay, the upper layer of the Ladock Beds (Devonian Slates). The place where he so found it had not been dug into for the purpose of burial. It also occurred in the brown sandy clay in which the late Keltic burials were placed, but not in the 12 or 13 feet of bright shell-sand beneath the top soil and above the interments. Roman remains (a coin of the younger Faustina) had occurred no deeper than plough-depth.

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We are pleased to hear that Mr. J. Wilfrid Jackson has recently been asked by Dr. Bruce, F.R.S.E., of the Scottish National Antarctic Expedition, to undertake the Report on the Brachiopoda dredged by this expedition, and we look forward with interest to the publication of this Report. We believe that the material available has proved unusually interesting, and as with the Mollusca, has furnished surprising and most unexpected features, necessitating a good deal of investigation.

REVIEWS.

"THE MIGRATION OF BIRDS," by T. A. Coward (Cambridge Manuals of Science and Literature: Cambridge University Press, 1s.)—A notable volume in a remarkable series. Mr. Coward admirably carries out the intention of the promoters. Reviewing the more serious works dealing with the subject of the migration of birds from the earliest times to modern days, a fine and clear outline of all the varied views and theories is presented. The reader is able to follow with perfect understanding the discussion and final weeding out of erroneous notions; the treatment of unsatisfactory and untenable theses; and the selection of those likely to stand the test of time and to render valuable assistance to the elucidation of difficult problems. Most of the works quoted are inaccessible to the general reader, and he cannot peruse this little work without feeling himself more conversant with the whole subject than he has hitherto been.

Many illustrations are derived from observations made in Cheshire and Lancashire. Thus, in referring to the fact that certain species show partiality for particular localities, mention is made of the fact that though, on passage in spring and autumn, Goldeneyes may be met with occasionally on any of the Cheshire meres, at Oakmere one may be almost certain of seeing parties of this species any time during the periods of passage. The Curlew may be heard or seen passing over any part of the county, but only in the Delamere fields do we frequently meet with flocks feeding in inland Cheshire. The passing flocks of Golden Plovers have their favourite fields, and the lower reaches of the Mersey, where the common Sandpiper is rare as a summer resident, are visited every autumn by parties of birds on passage.

When that remarkably disastrous flight of birds occurred on the south-east extremity of Ireland at the end of March, 1911, Mr. Coward mentions that similar movements were noticed on the north coast of Wales and in Cheshire. "On the nights of the 30th and 31st, birds in large numbers passed over Bangor and the Menai Straits; amongst them were Golden Plover, and the next day these birds with Fieldfares and Redwings were more abundant than before in the mid-Cheshire fields. On the night of April 2nd, from dusk to midnight, a large passage occurred over Mere in Cheshire, where Curlew, Golden Plover, Oyster-catcher, and Wild Duck were recognised by their calls."

In such a limited space a large array of critical questions are discussed—routes and their true significance, the elevations at which birds fly on migration, the sense of orientation, the part played by winds, and the perils attendant on migration.

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"THE HEPATICS OF SUSSEX."—*Hastings and East Sussex Naturalist*," Vol. 1., No. 6, June, 1911, by W. E. Nicholson.

This is the most valuable contribution to our knowledge of the British Hepaticæ which has appeared recently, and the author may be complimented on his thorough knowledge of the subject, and congratulated on the numerous discoveries he has made in a county which has been the scene of the labours of such cryptogamic botanists as Jenner, Mitten, Davies, and others. It is a model county list, comprising 124 species, with interesting notes on many of them, and full descriptions of numerous new species which have been added to our Flora by Mr. Nicholson. It is illustrated with figures of 21 Sussex species, 20 of them being drawn by the Rev. H. G. Jameson, from a series to be used by Mr. Macvicar in his forthcoming Handbook of British Hepatics.

These illustrations are very beautiful, and although small are perfect, all the essential characters being accurately drawn; with their aid the student will be able to identify the most critical of our species with little difficulty.

As several of the rare species figured in this list may reasonably be expected to be found in the districts covered by the *Lancashire Naturalist*, I have ventured to call attention to it, so that students of these plants may be on the look-out for them.

WM. HY. PEARSON.

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The Board of Agriculture has issued, amongst others, leaflets on "Bacteriosis of the Potato and Tomato"; "The Composition of Seaweed and its use as a manure"; "Common Weeds—I"; and "Swift Moths."

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In the official report of Dr. Gordon Hewitt's paper on "The Control of Insect Pests in Canada," as given on p. 367 of our last issue, *Hylesinus trifolii*, J. G. suggests, should possibly be *Hylastinus obscurus* (Marsham).

Notes from Periodical Journals.

The Field, Feb. 10th, p. 251.—Mr. H. H. Wardle (Egremont, Cheshire) records the appearance of six Green Cormorants or Shags (*Phalacrocorax graculus*) in Cheshire, a species but seldom seen there. Of these one was shot at Ashton-Hayes, and is now in the Grosvenor Museum, Chester, a second was shot at Alvanley, a third at Nantwich, and a fourth at Waverton.

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The Zoologist, Feb. 15th, 1912, pp. 72-74.—A further letter on "Nocturnal Redwings" from Mr. Fredk. J. Stubbs summing up and commenting on the facts recorded by other naturalists in reply to Mr. Stubbs' first article on this interesting matter. Mr. Stubbs asks some pertinent questions: "Are these nocturnally calling Redwings *migrants* in the usual sense of the word? Why, of all our Oscines, is the Redwing the only one that does not change its quarters silently? Why do they call most during the first week in November, when, if I am to believe the evidence of my eyes, the immigration is in full force in the previous month? Why are they comparatively silent during the spring migration? Why are they always at or about the same altitude, following (from the evidence of our ears) all the contours of the highest hills and the deepest valleys?" Mr. Stubbs also gives some interesting notes regarding the Redwing's song.

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British Birds, Vol. V., March 1st, 1912, pp. 282-286.—A list, entitled "The 1912 'Wreck' of the Little Auk," sets forth the published records of the occurrences of this bird in the different counties during the severe weather we experienced during the end of January and beginning of February. It would serve no good purpose to give these records in detail, and I can only add an hitherto unpublished record for North Lancashire, namely, one picked up under the telegraph wires on the side of the River Lune, just above Lancaster, by the head water bailiff (Mr. James Gornall, Lancaster), on Feb. 2nd. This bird had been completely decapitated against the wires, and is the first instance I have come across of the "Little Auk" being "telegraphed."

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British Birds, March 1st, pp. 279-280.—Mr. M. V. Wenner records a Barnacle Goose (*Bernicla leucopsis*) on Radnor Mere, Alderley, Cheshire, from January 18th, 1912, to the morning of the 19th. The weather was exceedingly wild at the time.

British Birds, p. 280.—Mr. E. A. S. Elliot records the shooting of a female Ferruginous Duck (*Fuligula myroca*) off Tacket Wood, on the Kingsbridge Estuary, South Devon.

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British Birds, p. 281.—Mr. T. A. Coward, in company with Messrs. T. Hadfield and T. Baddeley, watched an *adult* drake Smew (*Mergus albellus*) at close quarters on Marbury Mere, near Northwich, Cheshire, on January 27th, 1912. The bird was still on the water on the 28th, but on the 29th the mere froze over and the bird was not visible. When the thaw set in it returned, was seen by Mr. Coward on Feb. 10th, and was still on the water on the 18th. [Adult drake Smews are very rare anywhere in this country, although immature birds (in the brown-headed plumage) are infrequently killed during winter, more especially on the East Coast, the bird being nowhere of common occurrence in British waters.—F.W.S.]

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British Birds, p. 281.—On January 4th, 1912, a Little Bustard (*Otis tetrax*) was shot on a wet marsh at Strumshaw, near Norwich, by Mr. A. Mason, and another in Kincardineshire on January 1st, after frequenting a certain field for a fortnight (*Scottish Naturalist*, 1912, p. 44). Both the above are recorded by Mr. J. H. Gurney.

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Scottish Naturalist, 1912, p. 44.—Mr. W. Evans records the taking of the Northern Willow-Warbler (*Phylloscopus trochilus eversmanni*) at the Bass Rock Lighthouse on April 29th, 1909.

F. W. Smalley, M.B.O.U.

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In the *Agricultural Economist* there is a note on silica in plants. It is generally understood that the stiffness and quality of straw depends on the proportion of silica present, and that strong, well-grown straw contains a larger quantity of this mineral than weaker growths. Silica is certainly a rigid substance, and is contained in straw and grass, but this property is common to all minerals. The late Dr. Gilbert and Pierre seem to agree that the proportion of silica is lower in well-grown and ripened crops, and that the strength of these depends more on the amount of woody substance produced, and the more this is attained is the accumulated silica diluted. Maize has been grown successfully in soil from which all silica was abstracted, and oats and buckwheat have been grown without the presence of this mineral.

An obituary notice of George Robert Milne Murray (1858-1911), with portrait, appears in the *Journal of Botany* for March. G. C. Druce, M.A., contributes an interesting article on "Samuel Corbyn's Catalogue of Cambridge Plants," and besides lengthy notes on Algæ from Africa and Queensland, G. S. West, M.A., describes a new species, *Euastrum laticolle*, from Lindeth, near Bowness, Westmorland.

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In the same Journal W. B. Grove, M.A., discusses the application of the generic names *Sphærella* and *Mycosphærella*, which have been attended with much confusion, owing to the name *Sphærella* having been used by Algologists, as well as Mycologists.

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Mr. C. Crossland contributes to *The Naturalist* a list of recently-discovered Fungi in Yorkshire, which includes two Fungi new to science, several new to Britain, and 36 species new to Yorkshire. The Rev. Hilderic Friend, F.L.S., contributes a paper on the "Oligochæts of Great Britain and Ireland."

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MANCHESTER FIELD NATURALISTS.

The members of the Field Naturalists visited Chetham College during February, under the leadership of Mr. John Cantrill, and through the courtesy of the librarian, Mr. W. T. Browne, they were privileged to view a series of the rare works on botany, ornithology, and zoology. Audubon's "Birds of America" was the one most appreciated, and Mr. Buckley gave some particulars relating to this naturalist and his great work. Having accumulated a mass of material, he wished to publish the work, but could find no one who would take the risk. He accordingly decided to bring the work out himself, though he was entirely without the necessary capital. He got a specimen part of five plates printed, and with indomitable energy and perseverance sought subscribers for the costly work. This was to be in eighty parts at £2 2s., 160 guineas in all without the binding. In England, France, and the States he secured about three hundred subscribers, but many failed to keep their promises, and only 173 complete copies were printed.

ADDITIONAL NOTES ON THE PLEISTOCENE FAUNA OF DOG HOLES, WARTON CRAG.

By J. Wilfrid Jackson, F.G.S.

Since the publication of my previous papers dealing with the Molluscan and Vertebrate remains found in the cave-earth at Dog Holes (*Lancs. Nat.*, vol. 2, 1909-10, pp. 217-222, 227-229, 233-238, 261-265, 323-333), my friend Mr. M. A. C. Hinton has been doing pioneer work in revising the British Fossil Lemmings, Voles, and Shrews. Several preliminary papers have already been published by this author dealing with these creatures, and with the light they throw upon the many obscure problems of geographical distribution. To this is added some very lucid and well-considered generalisations on the climate of the Pleistocene Period.

Mr. Hinton's studies have chiefly been made upon the large amount of material obtained at the famous Ightham Fissures, by such indefatigable workers as Messrs. Lewis Abbott, A. S. Kennard, Dr. F. Corner, and others, as well as to some extent upon material collected at Langwith Cave, Derbyshire, by the Rev. E. Mullins, and from numerous other sources, including some material from Dog Holes, Warton Crag, presented by me to the British Museum. In dealing with the Dog Holes specimens, Mr. Hinton has had occasion to revise several of my former identifications, and the chief object of this article is to give a few remarks on these. The various species under discussion are as follows:—

VERTEBRATA.

Sorex araneus, Linnè (Common Shrew).—Mr. Hinton remarks upon the great breadth of brain-case of one of the skulls of this species presented to the British Museum. In discussing the lower jaws, he states that of the fourteen examples measured twelve agree with those of *S. araneus*. The remaining two, with lengths of 8.9 and 9.1mm., are interesting, and may indicate the presence of *S. kennardi* Hinton, in this cave, but more material is required. I also possess four other jaws, two measuring 8.5mm. and two 9mm., which may be referable to this latter species. *S. kennardi* has recently been described from some specimens obtained by Mr. A. S. Kennard from the Third Terrace drift of the Lea Valley at Ponders End, Middlesex, this horizon being much older than Dog Holes. *S. araneus* is not known from any deposit in Britain of greater age than the latest part of the Pleistocene period.

Neomys fodiens (Schreber) (Water Shrew).—Amongst a number of Shrew jaws presented to the British Museum, Mr. Hinton has been able to differentiate one example which, in all probability, is referable to this species. It may, however, belong to a distinct form of *Neomys*, but until further material is forthcoming it is perhaps preferable to refer it to *N. fodiens*. This discovery is interesting, as it adds a further species to the list of small mammals already recorded from Dog Holes. The only other fossil records for Britain are Ightham Fissures and the Wye Cave. The Dog Holes specimen is figured by Hinton in the *Geological Magazine*, Dec., 1911, pl. xxv., f. 5.

Lemmus lemmus (L.) (Norwegian Lemming).—Owing to the fact that at present the remains from Dog Holes and elsewhere cannot be distinguished from the recent Scandinavian Lemming, the identification remains as already published.

Dicrostonyx gulielmi (Sanford).—The examples previously referred to the Arctic Lemming (*D. torquatus*) are distinguished from this last species by their considerably larger size, as well as by other points of difference. According to Hinton they are referable to *D. gulielmi*, which was founded by Sanford, in 1870, on some lower jaws from the Somerset caves. This species has also been found in the Langwith Cave, Derbyshire, the Wye Valley Cave, the Crayford and Erith brick-earth, probably in the Edenvale Cave, Co. Cork, and in France at Neschers, Pay-de-Dôme (Auvergne).

Arvicola abbotti Hinton? (Fossil Water-vole). — The specimens referred previously to *Microtus amphibius* L. are probably referable to Hinton's species, but more material is needed to confirm this. *A. abbotti* is an interesting Late Pleistocene form which has so far only been met with in the Ightham Fissures. Its skull is stated by Hinton to be highly specialised for a subterranean or fossorial mode of living. In the Alps and other parts of Central Europe Water-voles are found living which have forsaken the water, and one of them, *Arvicola scherman* (Alps and South Germany) has quite mole-like habits.

Microtus agrestis L. (Field Vole).—The exceedingly abundant remains of this species obtained at Dog Holes are capable of being separated out into two series. One series appears to agree fairly well with a form like that known to exist in the highlands of Scotland = *M. agrestis neglectus*; the other may be referable to *M. agrestis hirtus* now inhabiting S.E. England. Mr. Hinton is still engaged upon a careful investigation of these forms and I await his final report.

The *hirtus* form does not appear to occur in the Ightham Fissures material, all the specimens so far examined being of the *neglectus* variety. It will be of interest, therefore, if the occurrence of the two forms at Dog Holes is confirmed.

Microtus anglicus Hinton (=*gregalis*, Auct. non Pallas).—Hitherto this conspicuous element in the Late Pleistocene Fauna of Western Europe has been referred to *M. gregalis* of Pallas, but this species, according to Hinton's recent researches, has little to do with the fossil animal. He has, therefore, given the name *M. anglicus* to the fossil form in order to distinguish it.

Several lower jaws obtained at Dog Holes have been identified as belonging to *M. anglicus*; this form has also been met with at Ightham Fissures and other Late Pleistocene deposits.

The additions to the Dog Holes fauna as given above, together with those forms already recorded, supply ample evidence to place Dog Holes in line with Ightham Fissures, Langwith Cave, and other Late Pleistocene deposits in this country.

The succession of these microtine forms is now acknowledged to be of great importance for classification purposes, and with its aid the various cave deposits may be correlated with each other and with the drifts, with some measure of certainty.

Once again we have to thank the many loyal friends who have assisted us during the past year in placing the *Lancashire Naturalist* in a position of great stability. At no period have our prospects been brighter, and we look forward with great confidence to the coming year.

We have kept religiously to the two great objects of our publication—to promote a closer union of Lancashire and Cheshire naturalists, and to keep a perfect record of the nature work in the two counties. That our aim is understood and appreciated is evident by the kindly feeling existing between many naturalists in other counties and ourselves. We have everywhere met with the greatest kindness, and we appreciate the invitations sent to us from time to time to join in the gatherings of naturalists where so much good fellowship has been exhibited.

Naturally we could not have attained this measure of success without great sacrifice of time on the part of others, and we must again express our appreciation of the many kind efforts put forth on our behalf.

[End of Vol. IV.]